THE REVIEW

OF

APPLIED MYCOLOGY

Vol. XXVII

ISSUED BY THE COMMONWEALTH
MYCOLOGICAL INSTITUTE

THE COMMONWEALTH MYCOLOGICAL INSTITUTE
KEW, SURREY

1948

COMMONWEALTH MYCOLOGICAL INSTITUTE

EXECUTIVE COUNCIL

Sir Patrick R. Laird, c.b., f.r.s.e. (*Chairman*), United Kingdom; A. V. Hubbard (*Vice-Chairman*), Southern Rhodesia; Lieut.-Col. J. G. Robertson, b.s.a., f.r.s.a., Canada; J. E. Cummins, m.sc., Australia; Dr. E. Marsden, c.m.g., c.b.e., m.c., f.r.s., New Zealand; A. P. Van der Post, b.a. (hons.), b.sc. (agric.), Union of South Africa; J. W. Dulanty, c.b., c.b.e., Eire; The Deputy High Commissioner, India; The High Commissioner for Pakistan; Sir Oliver Goonetilleke, k.c.m.g., k.b.e., Ceylon; J. G. Hibbert, c.m.g., m.c., Colonies, Protectorates, and Mandated Territories.

Secretary: Sir Herbert Howard.

STAFF

Director and Editor: S. P. Wiltshire, m.a., d.sc. *Assistant Director and Sub-Editor*: H. A. Dade, a.r.c.s. *Mycologist*: E. W. Mason, m.a., m.sc. *Senior Assistant Mycologist*: G. R. Bisby, ph.d. *Sub-Editor*: Grace M. Waterhouse, m.sc. *Assistant Mycologists*: S. J. Hughes, m.sc., M. B. Ellis, b.sc.

COMMONWEALTH AGRICULTURAL BUREAUX LIAISON OFFICERS

UNITED KINGDOM: W. R. Black, Esq., m.b.e., Ministry of Agriculture and Fisheries, 1/4 Cambridge Terrace, London, N.W. 1.

CANADA: H. L. Trueman, Esq., Office of the Deputy Minister, Administration Service, Dominion Department of Agriculture, Ottawa, Ontario, Canada.

AUSTRALIA: A. B. Cashmore, Esq., m.sc., Information Service, Commonwealth Council for Scientific and Industrial Research, 425 St. Kilda Road, Melbourne, S.C. 2, Victoria, Australia.

NEW ZEALAND: N. A. Marris, Esq., m.sc., Department of Scientific and Industrial Research, Wellington, C. 1, New Zealand.

UNION OF SOUTH AFRICA: J. L. Serfontein, Esq., m.a., Department of Agriculture, Union Buildings, Pretoria, Transvaal, S. Africa.

SOUTHERN RHODESIA: Dr. J. C. F. Hopkins, d.sc., Department of Agriculture and Lands, Salisbury, S. Rhodesia.

COLONIES: G. F. Clay, Esq., c.m.g., o.b.e., m.c., Agricultural Adviser to the Secretary of State for the Colonies, Colonial Office, Sanctuary Buildings, Great Smith Street, London, S.W. 1.

INDIA: Sardar Bahadur Sir Datar Singh, Vice-Chairman, Indian Council of Agricultural Research, Keeling Road, New Delhi, India.

EIRE: M. J. Barry, Esq., Department of Agriculture, Dublin, Eire.

SUDAN: The Chief of the Research Division, Department of Agriculture and Forests, Wad Medani, Sudan.

CEYLON: K. Kanagasundaram, Esq., b.a., Assistant Secretary, Ministry of Agriculture and Lands, Colombo, Ceylon.

PRINTED IN GREAT BRITAIN AT THE UNIVERSITY PRESS, OXFORD
BY CHARLES BATEY, PRINTER TO THE UNIVERSITY

ERRATA

VOLUME XXII

page 418 line 13 for '259' read '359'

VOLUME XXVI

542 1 for 'xxii' read 'xxiii'

178 43 for *Q. pinus*' read '*Q. prinus*'

VOLUME XXVII

23 2 for '*F.o.* f. 6.' read '*F. conglutinans* var. *callistephi*'

27 33 for '*helicrisii*' read '*padi*'

32 23 for 'setting' read 'settling'

42 42 for 'Mosaic' read 'Hop chlorotic disease virus'

129 20 for 'xxv' read 'xxvi'

158 15 for '*peraenne*' read '*perenne*'

33 for 'sweet potato' read 'sunn hemp [*Crotalaria juncea*]'

175 30 for 'Clinto' read 'Clinton'

192 24 for '*Acta trop.*' read '*Agricultura, Bogotá*'

213 5 for '*acremonium*' read 'sp.'

221 51 for 'below' read 'above'

251 3 for '*cremonis*' read '*cremoris*'

255 6 for '9–11' read 'G–11'

260 8 for '*Phaeosaccardulina*' read '*Phaeosaccardinula*'

271 47 for '*anguira*' read '*anguria*'

276 37 for '(E.P.)' read '(R.P.)'

288 37 for '*dianthus*' read '*dianthi*'

310 35 for 'trituated' read 'triturated'

312 17 for 'Solomon' read 'Salaman'

369 17 for 'Zach' read 'Zäch'

406 10 for '*annum*' read '*annuum*'

28 for '*Raghnildiana*' read '*Ragnhildiana*'

418 20 for 'GARRET' read 'GARRETT'

448 28 for '*panicii*' read '*pancicii*'

456 14 for '*wilkommii*' read '*willkommii*'

476 39 for **'Mathiola'** read **'Matthiola'**

513 2 for '*savastonoi*' read '*savastanoi*'

2 for '*tonelliarum*' read '*tonellianum*'

2 for '*savastonei*' read '*savastanoi*'

555 39 for '*pennisetii*' read '*penniseti*)'

COMMONWEALTH MYCOLOGICAL INSTITUTE

REVIEW
OF
APPLIED MYCOLOGY

VOL. XXVII JANUARY 1948

STEWART (D.). **Combination of Cercospora leaf-spot resistance and curly-top resistance in Sugar-Beet varieties.**—Abs. in *Phytopathology*, xxxvii, 6, p. 441, 1947.

The sugar beet variety U.S. 216, resistant to leaf spot (*Cercospora*) [*beticola*] but extremely susceptible to beet curly top [virus: *R.A.M.*, xxvi, p. 370], was crossed with S.L. 611, U.S. 12, and U.S. 22/1, mass-selected curly-top resistant varieties with a high degree of susceptibility to leaf spot. The F_1 progeny were then backcrossed with U.S. 22/1. Selections were then made under conditions of severe exposure to leaf spot, and further selection from their offspring for resistance to *C. beticola* [ibid., xxvi, p. 434] was carried out. Seed from this second selection was increased at State College, New Mexico, by the field overwintering method. Tested in 1944, S.P. 3–6–0 proved equally resistant to curly top with U.S. 221 and only slightly less so than U.S. 216. In 1946 the resistance to curly top and leaf spot of S.P. 456–0, produced in the same way, was equivalent to that of the respective resistant parents.

AFANASIEV (M. M.) & MORRIS (H. E.). **Effect of different soil and seed treatments on the control of seedling diseases of Sugar Beets under controlled conditions.**—*Proc. Amer. Soc. Sug. Beet Technol., 1946*, pp. 331–340, 1947.

Investigations were made [? in 1946] at the Agricultural Experiment Station, Bozeman, Montana, into the effects of various soil and seed treatments on the control of sugar beet seedling diseases [*R.A.M.*, xxiv, p. 269], using different chemical seed dressings and different amounts of treble superphosphate and of sodium nitrate plus treble superphosphate applied to the seed surface. The results showed that all the plants from seeds treated with the chemicals were diseased except a few from segmented seeds treated with spergon and thiosan. The plants from untreated whole and segmented seeds in soil fertilized with nitrogen plus phosphorus showed 53·1 and 33·3 per cent. diseased seedlings, respectively, those in soil fertilized with nitrogen, phosphorus, and manure 45·9 and 34·6 per cent., respectively, while those from untreated seed in unfertilized soil were almost all diseased. These results, which confirm those of earlier work [ibid., xxv, p. 148], show that any fertilizer which produces vigorous, fast-growing seedlings is more important in controlling beet root rots than chemical seed treatments.

Further work demonstrated that treble superphosphate, applied to the seed surfaces at rates of 20 to 100 lb. per 100 lb. seed in unfertilized soil, resulted in a slight decrease in seedling disease and an increase in the weight of individual beets. In soil fertilized with nitrogen, phosphorus, and manure seeds whether treated with treble superphosphate or untreated developed little seedling disease and produced beets of greater weight per plant. On the whole, this experiment showed that if a soil is well fertilized no benefit results from treating sugar beet seeds with treble superphosphate.

A final experiment conclusively demonstrated that sodium nitrate and treble superphosphate applied alone and together to the surface of the seeds had no beneficial effect on reduction of seedling disease or on the promotion of a more rapid

COMMONWEALTH MYCOLOGICAL INSTITUTE

REVIEW
OF
APPLIED MYCOLOGY

VOL. XXVII JANUARY 1948

STEWART (D.). **Combination of Cercospora leaf-spot resistance and curly-top resistance in Sugar-Beet varieties.**—Abs. in *Phytopathology*, xxxvii, 6, p. 441, 1947.

The sugar beet variety U.S. 216, resistant to leaf spot (*Cercospora*) [*beticola*] but extremely susceptible to beet curly top [virus: *R.A.M.*, xxvi, p. 370], was crossed with S.L. 611, U.S. 12, and U.S. 22/1, mass-selected curly-top resistant varieties with a high degree of susceptibility to leaf spot. The F_1 progeny were then backcrossed with U.S. 22/1. Selections were then made under conditions of severe exposure to leaf spot, and further selection from their offspring for resistance to *C. beticola* [ibid., xxvi, p. 434] was carried out. Seed from this second selection was increased at State College, New Mexico, by the field overwintering method. Tested in 1944, S.P. 3–6–0 proved equally resistant to curly top with U.S. 221 and only slightly less so than U.S. 216. In 1946 the resistance to curly top and leaf spot of S.P. 456–0, produced in the same way, was equivalent to that of the respective resistant parents.

AFANASIEV (M. M.) & MORRIS (H. E.). **Effect of different soil and seed treatments on the control of seedling diseases of Sugar Beets under controlled conditions.**—*Proc. Amer. Soc. Sug. Beet Technol., 1946*, pp. 331–340, 1947.

Investigations were made [? in 1946] at the Agricultural Experiment Station, Bozeman, Montana, into the effects of various soil and seed treatments on the control of sugar beet seedling diseases [*R.A.M.*, xxiv, p. 269], using different chemical seed dressings and different amounts of treble superphosphate and of sodium nitrate plus treble superphosphate applied to the seed surface. The results showed that all the plants from seeds treated with the chemicals were diseased except a few from segmented seeds treated with spergon and thiosan. The plants from untreated whole and segmented seeds in soil fertilized with nitrogen plus phosphorus showed 53·1 and 33·3 per cent. diseased seedlings, respectively, those in soil fertilized with nitrogen, phosphorus, and manure 45·9 and 34·6 per cent., respectively, while those from untreated seed in unfertilized soil were almost all diseased. These results, which confirm those of earlier work [ibid., xxv, p. 148], show that any fertilizer which produces vigorous, fast-growing seedlings is more important in controlling beet root rots than chemical seed treatments.

Further work demonstrated that treble superphosphate, applied to the seed surfaces at rates of 20 to 100 lb. per 100 lb. seed in unfertilized soil, resulted in a slight decrease in seedling disease and an increase in the weight of individual beets. In soil fertilized with nitrogen, phosphorus, and manure seeds whether treated with treble superphosphate or untreated developed little seedling disease and produced beets of greater weight per plant. On the whole, this experiment showed that if a soil is well fertilized no benefit results from treating sugar beet seeds with treble superphosphate.

A final experiment conclusively demonstrated that sodium nitrate and treble superphosphate applied alone and together to the surface of the seeds had no beneficial effect on reduction of seedling disease or on the promotion of a more rapid

development of the seedlings. On the other hand, plants grown from untreated seeds in soils with complete fertilizers had only a slight amount of disease; the resulting plants were much taller and heavier than those grown from treated seeds in unfertilized soil.

Gaskill (J. O.) & Kreutzer (W. A.). **Seed treatment dosage rate studies on the control of damping-off of Sugar Beets.**—*Proc. Amer. Soc. Sug. Beet Technol., 1946*, pp. 341–348, 1947.

Experiments carried out in Colorado in 1943, 1944, and 1945 on the control of sugar beet damping-off (caused mainly by *Pythium ultimum* [*R.A.M.*, xxiv, p. 85], though a species of *Phytophthora* [ibid., xx, p. 508] appeared to have a minor part in one test, and *Fusarium* spp. were isolated in several) by seed-dusting treatments indicated that the minimum dosages necessary for satisfactory control under the conditions that prevailed were arasan 16 oz. per 100 lb. seed [ibid., xxiv, p. 405; xxv, p. 379], new improved ceresan 6 oz., 2 per cent. ceresan 12·7 oz., Du Pont 1452 F 5 oz., and yellow cuprocide 16 oz. In commercial practice slightly lower minimum standards might be preferable. In 1943 all treatments gave significantly higher stands than the untreated, in 1944 only new improved ceresan at 8 oz. and arasan at 16 oz. gave significantly superior stands, and in 1945 again all were significantly better except the higher dosages of spergon.

Downie (A. R.). **Seed treatment studies.**—*Proc. Amer. Soc. Sug. Beet Technol., 1946*, pp. 360–363, 1947.

In sugar beet seed treatment tests carried out in 1944 and 1945 [see preceding abstract] arasan was the only dressing which gave significantly better stands than no treatment at East Grand Forks, Minnesota, Center, Colorado, and Grand Island, Nebraska. At the first-named location all treatments gave significantly better stands than the untreated. At four other centres, the seed treatments were not beneficial (except phygon [see below, p. 3] in one test) and, at three of them, were detrimental.

Greenhouse tests with nine different soils resulted in significantly better stands when sheared seed was treated with arasan, new improved ceresan, or phygon than when the seed was not treated. There were no significant differences among the three treatments for any one soil, or between the same treatments in different soils. The treatments did not, however, give the same degree of protection in all the soils, the organisms causing damping-off probably being different in some.

Isaksson (A.), Brewbaker (H. E.), & Bush (H. L.). **Seed treatment tests 1944 and 1945.**—*Proc. Amer. Soc. Sug. Beet Technol., 1946*, pp. 349–359, 1947.

Two series of tests of different seed treatments against sugar beet seedling diseases [see preceding abstracts] conducted at Longmont Experiment Station, Colorado, and in local fields, showed that very wide variations in the effectiveness of various treatments existed between individual fields. On the whole, however, new improved ceresan and arasan fairly consistently gave good results, while Du Pont 1452 F and cuprocide, alone or in combination, were also satisfactory, though less consistently. Applications of large amounts of fume [treble] phosphate alone to the seed consistently reduced seedling counts, although mixtures of heavy amounts of phosphate with fungicides approached or compared favourably with the fungicides alone in effectiveness. Nitrogen (equal parts of ammonium sulphate and sodium nitrate), alone or in combination with fungicides, was frequently detrimental and in no instance statistically beneficial.

The possibility of devising some standard seed treatment, which is universally applicable, is discussed and, while natural factors may make this difficult of achievement, it is not considered to be altogether impracticable.

Leach (L. D.). **Seed-borne Phoma and its relation to the origin of Sugar Beet seed lots.**—*Proc. Amer. Soc. Sug. Beet Technol., 1946*, pp. 381–388, 1947.

Seed-borne infection by *Phoma betae* [*R.A.M.*, xxvi, p. 90] was found in a number of sugar beet seed lots in the United States, especially in those produced in areas where showers or high humidity occurred during seed maturity and harvesting. Germination tests of 125 seed lots in greenhouse flats containing pasteurized soil showed heavy infection in several lots from the Willamette Valley, Oregon, where overhead irrigation was practised, light to moderate infection in lots from Medford, Oregon, Shasta Valley, California, and St. George, Utah, and very light infection in seed from Hemet Valley, California.

Seed disinfection by immersion in ethyl mercury phosphate solution was highly effective in eliminating infection. Of the dusts tested, ceresan and new improved ceresan appeared to give the best results, though phygon and arasan also gave good control. The disinfection [with ethyl mercury phosphate] of some infected lots increased germination on blotters and emergence in sand or soil.

Morris (H. E.) & Afanasiev (M. M.). **Growing Sugar Beets following Alfalfa in Montana.**—*Proc. Amer. Soc. Sug. Beet Technol., 1946*, pp. 389–393, 1 fig., 3 graphs, 1947.

A four-year experiment was started in the autumn of 1941 at Huntley Field Station, Montana, on plots where the four-year rotation, begun in 1916, consisted of two years of lucerne, sugar beets, and oats. The land had produced only poor sugar beet yields previously owing to loss of seedlings from root rot [due to various fungi, including *Phoma betae*: *R.A.M.*, xxv, p. 149]. In 1941, one plot in its second year of lucerne was divided equally into four subplots. On C and D the lucerne stubble was shallow-ploughed after the second crop had been removed; treble superphosphate (50 lb.) and manure (1 ton) were applied to subplot D, and after two or three weeks both plots were ploughed and irrigated. On plots A and B the stubble was not shallow-ploughed until after the third crop of lucerne had been removed, the same fertilizer amendment being added to B; later both were deep-ploughed. The following spring, the same cultural procedures were repeated and all four plots were planted with sugar beets. Each year another plot of the same rotation was divided and the four parts treated in the same way.

The data obtained showed that the percentages of seedling disease present in the A plots in 1942, 1943, 1944, and 1945 were, respectively, 38·2, 47·2, 39·3, and 94, the corresponding figures for B being 23·2, 19·7, 7·5, and 62·5; for C, 26·2, 54·5, 60, and 94·9; and for D, 12·8, 13·9, 18·6, and 56·5.

It is concluded that the planting of sugar beets on late autumn-ploughed lucerne land, unless manure, nitrogen, and phosphorus are added to the soil, is not recommended, root rot prevalence making it difficult to secure a satisfactory stand and yield. Ploughing after the second crop of lucerne followed by manurial amendment is recommended.

Henderson (R. W.) & Bockstahler (H. W.). **Reaction of Sugar Beet strains to Aphanomyces cochlioides.**—*Proc. Amer. Soc. Sug. Beet Technol., 1946*, pp. 237–245, 2 figs., 1947.

Field and greenhouse experiments carried out in Minnesota in 1945 showed that the sugar beet variety U.S. 216 is significantly more resistant than S.P. 1–9–00 to *Aphanomyces cochlioides* [*R.A.M.*, xxiv, p. 85], one of the agents of black root which has caused serious losses and considerable abandonment of production in the north-central States.

A number of inbred lines of sugar beets and hybrids between them were studied under field conditions in heavily and lightly infested soils. In general, when one or both of the parents were resistant, their hybrids significantly outyielded hybrids

between two susceptible inbreds. In preliminary greenhouse tests the reaction to *A. cochlioides* of three sugar beet strains closely corresponded to their reaction in the field.

COONS (G. H.), KOTILA (J. E.), & BOCKSTAHLER (H. W.). **Black root of Sugar Beets and possibilities for its control.**—*Proc. Amer. Soc. Sug. Beet Technol., 1946*, pp. 364–380, 4 figs., 1947.

In what is termed the 'humid area' of the western United States, seedling diseases, commonly called black root [*R.A.M.*, xxiv, p. 87; xxv, pp. 148, 385], are the main cause of poor stands among sugar beets, and are much more serious than in most sugar beet areas in the western United States, presumably because soil moisture conditions are not subject to the control possible under irrigation. In irrigated districts there is a reasonable likelihood that the plants will emerge uniformly. In the humid area emergence may be extremely irregular or most of the plants may be killed off by seedling diseases. Mechanical thinning is not safe in fields where the drill rows show large plant skips. If sheared seed is planted sparsely in order that the seedling stand may be mechanically blocked without hand-thinning, serious loss of individual plants may preclude this important mechanized operation.

The complex of sugar beet seedling diseases designated 'black root' is associated chiefly with *Pythium* spp., *Phoma betae*, *Rhizoctonia* [*Corticium*] *solani*, and *Aphanomyces cochlioides* [see preceding abstract].

Seed-dusting experiments from 1938 to 1942, inclusive, in Michigan, Ohio, and Virginia showed that in any year in which seedling diseases were a factor nearly all the dressings gave significantly better stands than were obtained from untreated seed. When little disease was present, the treatments did not depress the stands. No treatment was outstandingly superior to ceresan, though several did not differ from it significantly.

In a crop-sequence experiment in Maryland, ground that was held fallow in 1942 gave in 1943 a fair sugar beet stand; after maize and soy-beans the stands were significantly better, whereas after sweet clover [*Melilotus alba* and *M. officinalis*] and a mixture of maize and sweet clover they were significantly depressed. A very depressed stand resulted in 1943 after a dense covering of *Amaranthus retroflexus* in 1942. In a greenhouse experiment in which soil inoculated with the black root organisms was used, previous growing of sweet clover markedly increased damping-off; *A. cochlioides* and undetermined organisms from damped-off seedlings caused the greatest reduction in the stands, but *C. solani* also was significantly effective. The degree of resistance to *A. cochlioides* found in U.S. 216 and its hybrids is limited. Under severe exposures the yields may be only 5 tons per acre, but in the same conditions susceptible varieties may almost fail. Varieties with the degree of resistance now found may be expected to show to advantage in withstanding the chronic type of attack and to grow in spite of *A. cochlioides*. The use of these varieties, together with other direct and indirect methods of control, is essential and should reduce the losses sustained with non-resistant beets.

HASSAN (H. H.) & COX (C. E.). **Some effects of spergon as a Pea seed treatment on soil fungi.**—Abs. in *Phytopathology*, xxxvii, 6, p. 439, 1947.

The number of fungi cultured from a sample of soil planted with spergon-treated pea seed [*R.A.M.*, xxvi, p. 275] was less than half that from a comparable sample planted with untreated seed. When aliquots of soil were subjected to various concentrations of the fungicide in soil suspension for different periods before culturing, a dosage of 1 in 100 was found to inhibit all growth after a momentary exposure, while at 1 in 1,000 the same effect was obtained by treatments of over 24 hours' duration. The pea pathogens, *Pythium* sp., *Rhizoctonia* [*Corticium*] *solani*, *Asco-*

chyta pinodella, and *Fusarium solani* f. *pisi* were cultured on Czapek's agar containing several concentrations of spergon. At 1,000 and 100 p.p.m. the chemical destroyed *P.* sp. and retarded the growth rate of *A. pinodella* and *F. solani* f. *pisi*. At 1,000 p.p.m. spergon was fungistatic to *C. solani* but not fungicidal.

Le Beau (F. J.). **A virus-induced top necrosis in Beans.**—Abs. in *Phytopathology*, xxxvii, 6, p. 434, 1947.

The mechanical inoculation of bean (*Phaseolus vulgaris*) seedlings with a virus which had caused severe systemic necrosis of beans at Crystal Springs, Mississippi, in 1944 resulted in a fine, systemic, chlorotic stippling which rapidly became necrotic and was followed by premature abscission of the leaves and flowers. The plants of some varieties were killed outright, while in others, e.g., Black Valentine, Bountiful, and Tendergreen, the effects were generally milder and very young seedlings often recovered. The leaf buds of recovering plants proliferated copiously, producing a bunchy growth of mottled and misshapen leaves and, occasionally, blossoms. Other susceptible legumes included the Small White variety of *P. lunatus* (Fordhook contracted only local infection), *P. multiflorus* [*P. coccineus*], vetch, garden and field peas, cowpea, soy-bean, white lupin, *Cyamopsis psoraloides*, *Melilotus indica*, *Crotalaria intermedia*, and *C. spectabilis*. In tobacco the virus caused local chlorotic ring-spotting which occasionally became systemic, and in cucumber a fine, chlorotic spotting and severe stunting. Ten minutes' heating at 68° C. inactivated the virus, suggesting a relationship with that responsible for soy-bean bud blight [tobacco ring spot virus: *R.A.M.*, xxv, p. 484] and a similar disease of *Cyamopsis psoraloides* reported by Chester and Cooper.

Stubbs (L. L.). **A destructive vascular wilt virus disease of Broad Bean (Vicia faba L.) in Victoria.**—*J. Dep. Agric. Vict.*, xlv, 7, 7 figs., pp. 323–332, 1947.

During the last 15 years broad beans in Melbourne gardens have suffered severely from a destructive wilt disease most prevalent during early winter and spring. The disease has not yet been observed outside the city. A root rot disease with identical symptoms has been attributed to *Pythium fabae* [*P. debaryanum*: *R.A.M.*, xii, p. 134]. In November, 1943, broad beans were inoculated with sap from diseased plants and developed symptoms identical with those of the disease attributed to the *Pythium*, thus confirming the hypothesis that it is a virus disease.

In the field naturally infected plants develop a lateral bending of the growing tip and the veins of the youngest inrolled leaves become blackened. Under glasshouse conditions the leaves show vein-clearing followed by vein necrosis. A few days after the development of the primary symptoms the top of a diseased plant has a flattened or rosetted appearance. The young tip rapidly becomes flaccid, blackened, and necrotic, and wilt progresses throughout the plant, which may collapse and die. The collar region is mostly blackened and the tap-root reduced to a shrivelled vascular cylinder. There is also vascular discoloration, especially in the collar region. During warm weather, when the disease develops more rapidly, wilting may occur without root or collar necrosis. Vigorous plants are more susceptible than those growing under hard conditions and usually die soon after the appearance of primary symptoms. Plants which survive the first phase later develop cupped, distorted leaves with irregular, dark green, blistered areas, surrounded by chlorotic tissue between the veins. The third phase of the disease is preceded by a reduction in size and marginal inrolling of the topmost leaves. The plants then become stiff and erect with small, leathery, chlorotic, inrolled leaves. Reddish-brown speck necroses develop on the lower leaves, and leaf shrivelling and abscission follow. Pod production is greatly reduced in this phase.

The leaves of bean plants raised in sterilized soil in the greenhouse or field were dusted with 600-mesh aloxite [carborundum] and were wiped with a ground glass

spatula, or a muslin-covered cotton-wool pad dipped in infective, undiluted broad bean juice. When sap from beans in an early stage of the disease was used 100 per cent. infection was obtained. The varieties Leviathan Longpod, Coles's Dwarf Prolific, and tick beans appeared equally susceptible. Seed transmission seems unlikely, as seed from diseased plants has always produced healthy progeny. The natural mode of transmission is not yet known.

Pea, vetch, Tangier pea (*Lathyrus tingitanus*), sweet pea, blue lupin (*Lupinus angustifolius*), *Datura stramonium*, *D. ferox*, *D. metel*, *Solanum nigrum*, tomato, *Petunia hybrida*, [chilli] pepper, tobacco, *Nicotiana glutinosa*, beet var. Detroit, *Chenopodium album*, spinach, and *Antirrhinum majus* all reacted to inoculation with systemic symptoms except beet, which showed only chlorotic spots. Spinach developed very severe and characteristic symptoms, usually fatal. The virus was re-transferred to broad bean from pea, vetch, *P. hybrida*, and *A. majus*. After showing systemic symptoms, some of the experimentally infected plants 'recovered' [ibid., viii, p. 140] and attempts to transfer the virus from them or to reinfect them failed.

Further experiments showed that the virus incubated at 21° C. remained infective for 54 hours, but not for 72; the thermal inactivation point lay between 58° and 60°, and the maximum dilution at which the virus remained infective was 1 in 10,000. Some difficulty was experienced in obtaining successful transfers with juice from beans which had been infected for long periods. Plants of *D. stramonium*, which reacted to the virus with a number of primary lesions, were inoculated with the juice of five naturally infected broad bean plants in the three phases of the disease development. Results showed that virus activity was greatest in recently infected plants, decreasing as the infection period lengthened, those in mid and late phase being apparently non-infective.

Similarities in host range, symptoms, and physical properties suggest a possible relationship with the tobacco ring spot virus, which does not occur, however, in Australia and so comparison could not be made. The natural infection of broad bean with this virus, however, has not been reported.

The only control measures which can be recommended are the removal and destruction of the diseased plants as soon as the growing point develops a flattened or rosetted appearance, and delaying planting as long as possible, as beans sown in July were found to be remarkably free of wilt.

Techitch (J. P.). Бактериозе нашег Пасула. [Bacterial diseases of the Haricot Bean in Yugoslavia.]—*Ann. Trav. agric. Sci., Belgrade*, N.S., i, 1, pp. 18–61, 15 figs., 1946. [French summary.]

In this study the author presents the results of field trials carried out for several years at the Faculty of Agriculture and Sylviculture, Belgrade; at the Institute of Agricultural Microbiology from 1934 to 1938, and at the central Plant Pathology Station at Versailles during 1939, on the bacterial diseases of the haricot bean (*Phaseolus vulgaris*) in Yugoslavia. The symptoms of the diseases and descriptions of the causal organisms, *Bacterium* [*Xanthomonas*] *phaseoli* [*R.A.M.*, xxvi, pp. 372, 373], *Bact.* [*Pseudomonas*] *medicaginis* var. *phaseolicola* [ibid., xxv, p. 96 and loc. cit.], and [*Coryne*]*bacterium flaccumfaciens* [ibid., xxv, p. 89] are given. Several greenhouse inoculation experiments were made at different temperatures on different haricot varieties at various stages of development and on various parts of the plant, some of the results of which are figured.

Weimer (J. L.). **Disease survey of Soybean nurseries in the South.**—*Plant Dis. Reptr, Suppl.* 168, pp. 27–53, 1947. [Mimeographed.]

A disease survey of soy-bean nurseries in Alabama, Georgia, Louisiana, Mississippi, and South Carolina made yearly from 1944 to 1946 [cf. *R.A.M.*, xxiv, p. 264]

showed that the most widespread diseases were the two leaf spots known as bacterial pustule (*Xanthomonas phaseoli* var. *sojense*) and bacterial blight (*Pseudomonas glycinea*) [*P. glycines*: ibid., xxv, p. 544]. Wildfire (*P. tabacum*) [ibid., xxv, p. 200] appears to be increasing in importance annually. Frog eye (*Cercospora sojina*) [ibid., xxiv, p. 5] was not severe in 1946, except in some varieties at Baton Rouge, Louisiana, and Stoneville, Mississippi. A trace of mosaic [ibid., xxiv, p. 44] was present on all varieties at Tallahassee, Alabama, a few being moderately affected. Downy mildew (*Peronospora manshurica*) [ibid., xxvi, p. 156] was seldom present in more than trace amounts, though sometimes abundant on certain varieties.

During the surveys, a number of other diseases of soy-beans were observed in the nurseries and elsewhere. Among the chief were pod and stem blight (*Diaporthe phaseolorum* var. *sojae*) [ibid., xxiv, pp. 305, 357], charcoal rot (*Macrophomina phaseoli*) [ibid., xxiv, pp. 96, 132], sclerotial blight (*Sclerotium rolfsii*) [loc. cit.], anthracnose (*Glomerella glycines*) [ibid., xix, p. 512], leaf spot (*Alternaria* sp., or possibly arsenic injury), leaf spot due to *Phyllosticta phaseolina*, bud blight caused by the tobacco ring spot virus [ibid., xxv, p. 484], and an unknown virus disease.

The data obtained indicate that the varieties Ogden, C–N–S, Palmetto, Cherokee, and probably Louisiana Green and Dortchsoy str. 2 possess the greatest relative resistance to the bacterial pustule-blight complex. Though only relative, the resistance is stable enough to justify the use of such varieties (at least, of Ogden and C–N–S) as breeding stock. If any resistance to wildfire exists, it is most likely to be found in Ogden, C–N–S, Palmetto, Cherokee, and possibly Louisiana Green and Dortchsoy str. 2. The 1946 readings at Baton Rouge indicated that in group VII (the varieties were arranged in groups numbered 0 to VIII according to maturity) Roanoke, Volstate, F.C. 30261–1, and Wood's Yellow are probably the most resistant to frog eye; Ogden, Rose Non-pop, and Burdette str. 20 in group VI, and Acadian, Gatan, and Cherokee in group VIII were highly susceptible, and all the others more or less resistant. In general, the hay types are the most susceptible.

Lehman (S. G.). **Powdery mildew of Soybean.**—Abs. in *Phytopathology*, xxxvii, 6, p. 434, 1947.

The agent of the soy-bean powdery mildew collected in various parts of North Carolina in 1936, 1944, 1945, and 1946 has been identified as a species of *Microsphaera* with typical perithecia bearing about 20 appendages two to three times as long as the diameter of the perithecium and three to five times dichotomously branched. The following varieties were susceptible in greenhouse and field inoculations: Armredo, Cherokee, Herman, Ogden, Ralsoy, Seminole, Tokio, and a number of hybrid selections. On the other hand, Biloxi, CNS, Haberlandt, Roanoke, Rokusum, S–100, Volstate, Wood Yellow, and several hybrid selections remained free from infection.

Tims (E. C.). **White rot of Shallot and its control.**—Abs. in *Phytopathology*, xxxvii, 6, p. 437, 1947.

None of the shallot varieties and strains tested over a three-year period in Louisiana for resistance to white rot (*Sclerotium cepivorum*) [*R.A.M.*, xxiii, p. 512] showed any promise whatever. The adjustment of the soil pH from between 5·6 and 5·8 to 7 somewhat reduced the incidence and severity of the disease but did not adequately control it. Almost complete control was obtained by the application to the stands of semesan (1 oz. per gal.) or mercuric chloride (1 in 500) at the rate of 80 c.c. per plant.

Heuberger (J. W.). **New fungicides for Cucumbers.**—*Food Packer*, xxviii, 9, pp. 61–62, 1 fig., 1947.

Tests were carried out in Delaware in 1946 with some new organic fungicides for

the control of cucumber downy mildew (*Pseudoperonospora cubensis*) on the National Pickling variety. Seven applications were made between 24th June and 8th August at the rate of 75 gals. per acre for the first two, increasing up to 175 on full-grown plants. Three of the compounds substantially augmented the early yield (30th July), which is often the critical factor in profit or loss. They were dithane Z-78 (2½–100), zerlate (2–100), and fermate (2–100), resulting in increases of 27·1, 25·9, and 25·2 per cent., respectively, the corresponding figures for the total yields being 49·7, 48·2, and 35·4 per cent., respectively. Bordeaux mixture, used for comparative purposes, increased the early and total yields by 7·3 and 36·3 per cent., respectively. The lowest percentages of defoliation on 19th August occurred in the plots sprayed with dithane Z–78, dithane D–14 + zinc sulphate-lime 1½–1½–100, and parzate (1½–100) [*R.A.M.*, xxvi, p. 472] (8, 9, and 11 per cent., respectively, compared with 97 per cent. for the untreated), followed by manganese ethylene bisdithiocarbamate (1½–100) and Bordeaux (19 and 22 per cent, respectively). The maximum cash value per acre ($638) was secured by treatment with zerlate, followed by dithane Z-78 ($598), Bordeaux ($564), parzate ($554), and fermate ($532).

Epps (J. M.). **A new wilt-resistant Watermelon.**—Abs. in *Phytopathology*, xxxvii, 6, p. 433, 1947.

In 1941 a co-operative breeding programme aiming at the development of resistance in watermelons to *Fusarium bulbigenum* var. *niveum* was instituted by the Tennessee [*R.A.M.*, xxi, p. 440] and Mississippi Agricultural Experiment Stations. Some very promising seed lots from the latter Station were planted in wilt-infested soil at the former in 1942 and the resistant segregates self-pollinated. Highly resistant hybrids from a cross between Dixie Queen and Klondike selfed and selected survived in a location where the stand of a commercial variety was completely destroyed in the previous year. It combines resistance to the disease with attractive growth characters and heavy yields and is being released as a variety under the name of Miles.

Nusbaum (C. J.). **Studies of internal cork, a probable virus disease of Sweet Potato.**—Abs. in *Phytopathology*, xxxvii, 6, p. 435, 1947.

The typical foliar symptoms, indicative of a virus infection, associated with the internal corkiness of sweet potato roots [in South Carolina: *R.A.M.*, xxv, p. 97; xxvi, p. 181] have been consistently induced in plants arising from sound roots by inserting core grafts of corky root tissue into the healthy sweet potatoes. Infected roots were shown to carry the disease through storage and reproduce it in the next crop.

Ivanoff (S. S.). **Effect of presoaking unshelled Peanuts on fungus control, germination, and emergence.**—Abs. in *Phytopathology*, xxxvii, 6, pp. 433–434, 1947.

In eight laboratory trials [at the Texas Agricultural Experiment Station] one lot of Spanish groundnuts was soaked in water for 20 to 24 hours and germinated in Petri dishes at 100 per cent. humidity. The germination of unsoaked controls was started simultaneously with the immersion of the first. Counts after ten days showed fungal contamination on 58 per cent. of the soaked and 96 per cent. of the unsoaked pods, the pathogens concerned including *Fusarium*, *Penicillium*, and *Rhizopus* spp. and *Sclerotium rolfsii*. In every test there were fewer infected pods in the presoaked than in the unsoaked lots, the average germination being 69 and 26 per cent., respectively. In two trials in wet soil germination was approximately 35 per cent. in both soaked and unsoaked. Shelled groundnuts, with or without arasan seed disinfection, showed no higher germination. In each of two tests in

moist, sandy soil, the emergence of pre-soaked pods amounted to 77 per cent. compared with 19 and 45 per cent. for the controls.

Nikolaeva (Mme T. L.). Опыт выращивания Грибницы для разведения Шампиньонов в производственных условиях. [Experiments on growing Mushrooms for industrial cultivation.]—Volume of Scientific Works, Leningrad, 1941–1943, U.S.S.R. Academy of Sciences, pp. 349–354, 2 figs., 1946.

During the blockade of Leningrad in 1942, when the food situation became desperate, the Town Committee VKP, together with the Botanical Institute, started experiments in mushroom (*Psalliota arvensis*) cultivation which is fully described in this study. The method of raising mushrooms from spores is compared with that of cultivating them from sporophore tissue, and the author recommends the latter method as being far more advantageous for commercial purposes.

Bouriquet (G.). **Culture de Champignons comestibles dans les régions tropicales.** [Edible Mushroom culture in the Tropics.]—Abs. in *Bull. agric. Congo belge*, xxxviii, 2, pp. 422–423, 1947.

An account is given of a method of cultivation of the edible fungus *Volvaria volvacea* [*R.A.M.*, xxv, p. 25] at Antananarivo, Madagascar, based on those employed in the Dutch East Indies. A description of *V. volvacea* itself is also supplied.

Die wichtigsten Krankheiten und Schädlinge im Jahre 1946 (nach den Berichten der Pflanzenschutzämter der sowjetischen Besatzungszone bis zum Monat November). [The principal diseases and pests in the year 1946 (according to the reports of the plant protection bureaux of the Soviet zone of occupation up to the month of November).]—*NachrBl. dtsch. PflSchDienst*, N.F., i, 2, pp. 30–36, 15 maps, 1947.

This report, compiled on the usual lines [*R.A.M.*, xxii, p. 162], gives brief particulars of the incidence and distribution in 1946 of a number of well-known diseases and pests of agricultural crops in the parts of Germany lying within the Russian zone of occupation.

Blackie (W. J.). **Department of Agriculture. Report for the year 1946.**—*Coun. Pap. Fiji* 19, 18 pp., 1947.

This report contains the following items of phytopathological interest. Investigations are in progress concerning 'yellows' disease of rice, which was less prevalent than in 1945, and transport diseases of bananas. Noteworthy crop diseases were brown rot of potatoes (*Fusarium oxysporum*) [cf. *R.A.M.*, xix, p. 360; xxv, p. 42], crown rot of groundnuts (*Aspergillus* sp.) [ibid., xxvi, p. 180], maize mosaic [virus: ibid., xxi, p. 413], and tomato and soy-bean wilts [unspecified]. In one district downy mildew of sugar-cane (*Sclerospora sacchari*) [ibid., xxi, p. 347] and maize [*S. graminicola*] caused severe losses. Owing to the neglect of old banana plantations and lack of control measures the banana leaf [? *Mycosphaerella musicola*] and virus [banana bunchy top] diseases continued to reduce yields. A mosaic disease of *Canna* was reported for the first time and leaf spot of *Gerbera* (*Septoria gerberae*) caused losses in gardens.

Miller (P. R.) & Wood (Jessie I.). **An evaluation of certain phases of the emergency plant disease prevention project.**—*Plant Dis. Reptr, Suppl.* 167, pp. 1–21, 5 maps, 1947. [Mimeographed.]

The authors briefly review the results accruing from the Emergency Plant Disease Prevention Project initiated in the United States on 1st July, 1943, by the

Plant Disease Survey. The purpose of the scheme, approved by the Secretary of War and supported by emergency funds made available by the President, was to help protect the country's food, feed, fibre, and oil supplies by ensuring immediate detection of enemy attempts at crop destruction through the use of plant diseases [see next abstract]. The plan also aimed at providing workers with prompt and reliable information on outbreaks of plant diseases, whether introduced inadvertently or by design, while still in incipient stages.

The field work was conducted by 24 pathologists distributed over the whole of the United States, and two field laboratories, one at Beltsville, Maryland, and the other at Stillwater, Oklahoma, were established for consulting diagnosticians. The itineraries were planned in consultation with the Experiment Stations. Weekly reports were made to the officials of the State where the observations were made and to Beltsville. Detailed results of the survey are tabulated and discussed. Among the new diseases recorded were root rots of lettuce, eggplant, and chilli [*Capsicum annuum*] due to *Aphanomyces* sp., and target spot of cowpea and soy-bean (*Helminthosporium vignae*), while diseases found on new hosts included *Phytophthora megasperma* on spinach, *Diaporthe sojae* on cowpea and groundnut, *Pseudomonas tabaci* on soy-bean, and *Myrothecium roridum* [*R.A.M.*, xxvi, p. 474] on cowpea and soy-bean.

The data obtained indicated that the work effected, in addition to its protective nature, was of definite value to American agriculture in war-time by increasing the effectiveness of plant-disease control programmes throughout the country. It discovered sources of severe crop losses that previously had remained unrecognized and was instrumental in the application of control measures.

Miller (P. R.). **G-men of plant diseases.**—*Yearb. Agric. U.S. Dep. Agric., 1943–1947*, pp. 443–450, 1947.

An interesting account is given of some of the more important results obtained by the emergency plant disease project started in the United States in 1943 by the Plant Disease Survey to ensure that attempts at crop destruction by the introduction of plant diseases [see preceding abstract] would be detected immediately. About 150 diseases affecting some 60 crops were found in States where they had not been known to occur before. Among the records cited mention may be made of yellow spot of wheat (*Helminthosporium tritici-vulgaris*) [*R.A.M.*, xxii, p. 473], which was found in Virginia, West Virginia, Kansas, and Nebraska. The disease is considered to be serious in Japan, but seems to be less so in the United States.

Braun (W.). **Bacterial dissociation. A critical review of a phenomenon of bacterial variation.**—*Bact. Rev.*, xi, 2, pp. 75–114, 1 graph, 1 diag., 1947.

This critical review attempts to appraise the validity of various concepts of the nature of dissociation and its relationship to problems of bacterial variation in general [*R.A.M.*, xxvi, p. 443] with special reference to the literature since 1935. It deals with (i) some general manifestations of bacterial dissociation, (ii) the various concepts of dissociation, (iii) elimination of some older concepts and presentation of new data favouring the mutation-selection theory, (iv) dissociation as part of general bacterial variation, (v) the relation of dissociation to some basic and applied problems, and (vi) general conclusions and some implications from recent results upon future work. There is a bibliography of 257 references.

Gorlenko (M. V.). Двадцать пять лет изучения болезней хлебных злаков в СССР (1917–1942). [Twenty five years' study of cereal diseases in U.S.S.R. (1917–1942).]—*J. Bot. U.S.S.R.*, xxxi, 1, pp. 3–17, 1946. [English summary. Received September, 1947.]

This paper reviews, among other items, the results of studies in the U.S.S.R.

on the varietal resistance of cereals to Uredinales, the biology of the rusts, and the relationship between the hosts and parasites. Recently three cereal diseases not previously reported from the U.S.S.R. were found in Azerbaijan, viz., wheat flag smut (*Urocystis tritici*) [*R.A.M.*, xxvi, p. 173], *Tilletia pancicii* on barley [ibid., xv, p. 400], and a new rye smut, *U. secalis* Uljan [date not cited], which might be a southern race of *U. occulta* [ibid., xviii, p. 166].

The occurrence, during the period concerned, of wheat bunt (*T. tritici*) [*T. caries*: ibid., xix, p. 391] and other smuts and rye ergot (*Claviceps purpurea*) [ibid., xix, p. 209], is reviewed. Among the bacterial diseases black bacteriosis [*Xanthomonas translucens*: ibid., xxvi, p. 240] was most destructive on wheat, causing 50 to 90 per cent. yield reductions. Red-cared varieties (Ferrugineum, Milturum) are highly susceptible, white-eared (Lutescens, Velutinum) much less so. The results of the virus disease studies have already been noted in this *Review* [ibid., xxiii, p. 210].

Critopoulos (P. D.). **Over-summering and over-wintering of the cereal rust fungi.**—*Nature, Lond.*, clx, 4067, p. 507, 1947.

Inoculation tests were made using wheat leaves and culms severely infected with *Puccinia graminis tritici* [*R.A.M.*, xxvi, p. 483] and *P. triticina* kept from the previous season under four different storage conditions. Uredo and teleutospores of both rusts were produced on a susceptible wheat variety, Pusa, inoculated in both early and advanced stages of development. The inoculum was fairly well decayed, being infested by various saprophytic fungi; the uredospores showed only the walls, and about 98 per cent. of the teleutospores were destroyed. The author concludes that these rusts have some means of propagation in Attica other than by spores.

Fraser (J. G. C.). **Two new spring Wheats.**—*Sci. Agric.*, xxvii, 8, p. 396, 1947.

Two new spring wheat varieties, Saunders C.A.N. 3516 and Cascade C.A.N. 3593, have been developed at the Central Experiment Farm, Ottawa. The former is resistant to stem [black] rust [*Puccinia graminis*: *R.A.M.*, xxiv, pp. 183, 309] and loose smut [*Ustilago tritici*: ibid., xxiii, p. 162]; moderately resistant to bunt [*Tilletia caries* and *T. foetida*], root rot [*Helminthosporium sativum* and *Pythium* sp.], and black chaff [*Xanthomonas translucens* var. *undulosum*]; and is less susceptible to leaf [brown] rust [*P. triticina*] than Red Bobs or Thatcher. Cascade is highly resistant to black rust and mildew [*Erysiphe graminis*: ibid., xxvi, p. 386], moderately resistant to loose smut, and moderately susceptible to bunt and brown rust.

Sabourova (Mme P. V.). Физиологическое обоснование поражаемости Пшеницы бурой ржавчиной (**Puccinia triticina**) под влиянием различной влажности почвы. [Physiological characteristics of Wheat infected by *Puccinia triticina* at different soil humidities.]—*J. Bot. U.S.S.R.*, xxxi, 4, pp. 35–48, 1946. [English summary.]

The results of these studies on the physiological characteristics of wheat varieties infected with brown rust (*Puccinia triticina*) [? race 20] at different soil humidities [*R.A.M.*, xiii, p. 754] show that at 60 per cent. all the wheat varieties examined, with the exception of Affine (K–21826), which was immune from race 20 of *P. triticina*, suffered the greatest degree of infection, less at 40 and least at 25 to 30 per cent. Various degrees of infection at different soil moistures were related to the age of the plants and were especially noticeable in resistant varieties during the earing stage. It is suggested that the humidity of soil acts indirectly on infection by *P. triticina* by determining the physiological state of the host. The

penetration of the parasite into the plant probably depends on the anatomo-morphological characteristics of the host, and the expansion and development within the tissues on the host's physiological condition.

Comparing the results of her own investigations with those of other workers, the author concludes that the increase of protein and sugar content at higher soil humidity accounts for the greater susceptibility of wheats to brown rust.

Swenson (S. P.), Buchholtz (W. F.), & Grafius (J. E.). **Complementary genes for leaf rust resistance and the inheritance of stem rust reaction and awnedness in a spring Wheat cross.**—*J. Amer. Soc. Agron.*, xxxix, 9, pp. 739–749, 1947.

Plants and lines with a high degree of field resistance to leaf [brown] rust (*Puccinia rubigo-vera tritici*) [*P. triticina*] occurred in the progeny of a cross between two susceptible wheat varieties, Thatcher and Triunfo, at the South Dakota Agricultural Experiment Stations. The segregations obtained in the F_2 and F_3 were fairly satisfactorily explained by postulating two complementary dominant genes, one from each parent. Greenhouse observations on seedlings from resistant, segregating, and susceptible lines showed all to be uniformly susceptible, so that the field resistance is evidently a mature plant reaction. The subsequent breeding behaviour of resistant selections indicates that the resistance of Thatcher × Triunfo derivatives is more effective than that of certain lines of Hope.

At least two or three recessive genes for resistance to stem [black] rust (*P. graminis tritici*) were involved in differentiating between the resistant reaction of Thatcher and the susceptibility of Triunfo. χ^2 tests for independence of the three characters, brown and black rust reaction [cf. *R.A.M.*, v, p. 725; xiii, p. 428] and awnedness, gave no indication of linkage.

Thomas (I.), Samuel (L. W.), & Millington (A. J.). **Wheat variety trials on research stations.**—*J. Dep. Agric. W. Aust.*, Ser. 2, xxiv, 1, pp. 30–42, 4 figs., 3 graphs, 1947.

In this analysis of the 1946 wheat variety trials at Western Australian Research Stations it is stated that during the year a severe epidemic of wheat [black] rust [*Puccinia graminis*: *R.A.M.*, xxiii, p. 336] occurred in South Australia, preceded by heavy summer rains. The self-sown crops, germinating on stubble land, became seriously infected and the disease spread during the winter to neighbouring paddocks. Western Australia, however, has not experienced a rust epidemic for four years, but in view of the appearance in New South Wales and other States of a rust strain which attacks Eureka [ibid., xxv, p. 207] it is questionable whether this variety and its derivatives will remain resistant in Western Australia. The Department of Agriculture, therefore, asks farmers to send infected wheat plants, as soon as the rust is observed, to the Government Plant Pathologist, Department of Agriculture, Perth. Of the rust-resistant varieties now under cultivation in Australia, Frisco, M. 78, M. 79, M. 80, and M. 81 possess the Eureka or A type of resistance; M. 70 and M. 71 the B or Kenya C 6041 type; Charter [loc. cit.], Yalta [ibid., xxv, p. 301], Gabo, and Kendee, the C or Kenya C 6042 type; and Celebration, Hofed, Fedweb, and Warigo, the D or mature plant type. For the rust-liable districts in Western Australia the authors recommend varieties possessing the B, C, or D types of resistance, rather than A.

Bamberg (R. H.), Holton (C. S.), Rodenhiser (H. A.), & Woodward (R. W.). **Wheat dwarf bunt depressed by common bunt.**—*Phytopathology*, xxxvii, 8, pp. 556–560, 1947.

The rarity of the joint occurrence of common bunt (*Tilletia caries* and *T. foetida*) and dwarf bunt (form of *T. caries*) on the same wheat plant [*R.A.M.*, xxv, pp. 209,

298] suggested that their developmental processes are mutually antagonistic. The results of tests in Montana and Utah confirmed the validity of this hypothesis, showing common bunt to exert an influence of unknown origin on the dwarf form of the disease, irrespective of the wheat varieties and smut races used. Thus, in a test in 1941–2 on Utah Kanred, the rows of the first planting sown with clean seed averaged 61 per cent. dwarf bunt as against 17 per cent. dwarf and 64 per cent. common bunt in those planted with seed inoculated with race L–2 of *T. foetida*, the corresponding figures in the second planting being 51, 7, and 73 per cent., respectively; the percentages of plants infected with both dwarf and common bunt in the first and second plantings of seed inoculated with *T. foetida* were 6 and 3, respectively.

Other tests were designed to ascertain whether some races of common bunt are more effective than others in the suppression of the dwarf form. In the autumn of 1943 Hybrid 128 was inoculated with five races to which it is susceptible, i.e., L–1 and L–8 of *T. foetida* and T–10, T–16, and T–2 of *T. caries*, and Oro with two pathogenic (L–8 and T 16) and one causing little damage to it (T–10). The incidence of dwarf bunt in the resultant stands was comparatively low, but consistently smaller amounts developed in the rows with common bunt, regardless of the wheat variety or the race used as inoculum. In a further experiment in 1945 6, using the Golden and Yogo varieties and races L–7 and L–8 of *T. foetida*, the percentages of dwarf bunt in the uninoculated and inoculated rows of the former variety were 57 and 14, respectively, and of common bunt 0 and 70, respectively, the corresponding figures for the latter variety being 59 and 9 and 0 and 68, respectively.

Previous reports as to the stimulation of tillering by dwarf bunt were substantiated by this experiment, in which the average numbers of Golden heads in the rows inoculated with common bunt and in those with dwarf bunt only were 157 and 271, respectively, and the corresponding figures for Yogo 317 and 380, respectively.

Schuk (K.). **Neue Form der Warmwasserbeize gegen Ustilago tritici und U. nuda.** [A new form of the warm water treatment against *Ustilago tritici* and *U. nuda*.] —*Agrobiologie, 1947*, 1, pp. 103-113, 1947. [Russian. Abs. in *NachrBl. dtsch. PflSchDienst*, N.F., i, 3, p. 58, 1947.]

A simplified method for the treatment of wheat and barley seed grain against *Ustilago tritici* and *U. nuda*, respectively, was tested in the U.S.S.R. in 1939 and 1940 with encouraging results. The seed is immersed for $3\frac{1}{2}$ hours in a 0·5 per cent. soda solution at 45° C., resulting in the elimination of the smuts and yield increases of 14·2 and 8 per cent., respectively, in comparison with the untreated control batches. The treatment also reduced the incidence of barley stripe [*Helminthosporium gramineum*] by about one-half. The rapid drying of the alkalized seed is an additional advantage over the ordinary method of hot-water disinfection.

Kent (G. C.), Tyler (L. J.), & Jensen (N. F.). **Downy mildew on Wheat in New York.**—*Plant Dis. Reptr*, xxxi, 9, p. 320, 1947. [Mimeographed.]

During July several mature Yorkwin wheat plants growing on low, wet ground at Ithaca and others at Perry, New York, were observed to have distorted heads with spreading and fleshy green glumes, abnormally long awns, and slight phyllody. Affected culms reached only one-half to three-quarters of their normal height. Oospores in the leaf blades were found to be those of the downy mildew fungus, *Sclerospora macrospora* [*R.A.M.*, xxii, p. 62]. At Ithaca abundant pycnidia of *Septoria tritici* were also found on the leaves.

White (N. H.). **The etiology of take-all disease of Wheat. 3. Factors concerned with the development of take-all symptoms in Wheat. 4. The effect of agronomic practices on the incidence and severity of take-all.**—*J. Coun. sci. industr. Res. Aust.*, xx, 1, pp. 66–81; 82–86, 3 figs., 1947.

Continuing his researches on wheat take-all (*Ophiobolus graminis*) [*R.A.M.*, xxv, p. 338], the author carried out a glasshouse experiment in which Bencubbin wheat seed was sown in soil taken from areas in a field where healthy wheat had grown the year before and from adjacent patches that had given take-all plants, half of each soil being steam-sterilized. In half of each of these four lots, the soil was inoculated at seeding with a moderately pathogenic strain of *O. graminis*. Analysis of the data from all treatments showed no significant difference between soil types, i.e., take-all area soil and healthy area soil, inoculated or not. For all measures of pathogenicity the difference between inoculated and uninoculated sterilized soil was highly significant. For the unsterilized soil there were significant differences between the uninoculated and inoculated series only in the percentage of plants with seedling blight (0 and 25, respectively, in take-all area soil and 0 and 70, respectively, in healthy area soil) and the number of tillers per plant. Take-all occurred in all treatments except in the sterilized uninoculated soils from both areas. Steam-heating apparently killed the pathogen already present in the soil and increased the vigour of the plants. The primary causal relation of *O. graminis* to the disease was confirmed.

In steam-sterilized soil inoculated with *O. graminis* with the top soil maintained dry throughout the growing period, take-all symptoms, identical with those occurring in the field, developed in all plants, all ears being whiteheads, compared with 54 per cent. diseased plants with atypical symptoms in a similar series with wet top soil.

Examination of white-eared and normal-eared plants taken from the field during the seasons 1940, 1941, and 1942 showed a significant proportionality between the number of functioning roots and the amount of shoot tissue.

The evidence obtained strongly suggests that at least two primary conditions necessary for the development of take-all are the presence of *O. graminis* and a dry top soil [cf. ibid., xxvi, p. 295]. Whether a plant will be a whitehead or normal appears to depend on the capacity of the roots to function above a certain threshold value. This value is affected by the load of the shoot system on the functioning roots and by the moisture available in the soil horizons. When the top soil is dry, the surviving crown roots are unable to absorb water, and 'dry weather take-all' develops. When the top soil is wet the crown roots can function above the threshold value, provided there are enough of them. If, however, their development is impaired by *O. graminis*, or their rate of destruction exceeds their development, then in spite of the wet top soil the functional value of the crown-root system will drop below that of the threshold value for the plant concerned with its particular shoot 'load'. Such a plant will collapse and develop the white-eared condition.

In the second paper the author records observations on the effects of various agronomic practices on the incidence and severity of wheat take-all in a naturally infested field at Canberra. Two years' bare fallow resulted in the eradication of *O. graminis* from the soil as indicated by the complete absence of take-all and freedom from root lesions. Cropping with wheat for four years increased the severity of the disease and decreased crop vigour. One year's fallow, or oats in rotation with wheat, or oats–fallow–wheat rotation decreased the severity and increased the yield.

From the results of this series of studies and those reported in the literature, it is concluded that the presence of *O. graminis* in the soil is related to the previous history of the field. Practices conducive to its persistence in the soil are the

continued growing of susceptible crops [ibid., xxvi, p. 232] and favourable soil conditions, such as light-textured soil and high soil nitrogen content [ibid., xxiv, p. 95]. Practices leading to the disappearance of the fungus from the soil are the cultivation of non-susceptible crops, bare fallowing, rendering soil conditions unfavourable by compacting the seed-bed [cf. ibid., xxi, p. 481], and increasing the carbon content of the soil to activate biological antagonism [cf. ibid., xviii, p. 609].

The severity of the disease is influenced primarily by the capacity of the affected plant to outstrip root destruction with new root development and by the distribution of inoculum in the soil. Root destruction is influenced by the virulence of the strain of *O. graminis* and by the soil conditions affecting the rate of growth and spread of the fungus; root formation, on the other hand, is influenced by soil fertility, soil moisture, and the survival of crown-root primordia.

Wiebe (G. A.). **Improved varieties of Barley.**—*Yearb. Agric. U.S. Dep. Agric., 1943–1947*, pp. 403–412, 1 pl., 1947.

In this account of barley breeding work in the United States, the author states that the most serious defect in the Beecher variety is its susceptibility to loose smut [*Ustilago nuda*: cf. *R.A.M.*, xxvi, pp. 101, 448]. Glacier resists covered smut [*U. hordei*: ibid., xxv, p. 552] but is susceptible to loose smut. The resistance of Kindred to stem [black] rust [*Puccinia graminis*: ibid., xxvi, p. 49] has been confirmed. The composite hybrid (spring and winter types) Compana resists *U. nuda*. Rojo, from another composite cross, resists scald [leaf blotch, *Rhynchosporium secalis*: ibid., xxiv, pp. 55, 177] and net blotch [*Helminthosporium teres*: ibid., xxi, p. 329; xxv, p. 544]. Davidson is reputed to resist all forms of smut, but is susceptible to mildew [*Erysiphe graminis*: ibid., xxvi, p. 296], to which Texan is resistant.

The spring variety, Mars, resists black rust and leaf stripe [*H. gramineum*: ibid., xxvi, p. 151] and is moderately resistant to leaf blotch but susceptible to scab [ear blight, *Gibberella zeae*: ibid., xxiii, p. 480], loose smut, and leaf [brown] rust [*P. anomala*: ibid., xvii, p. 807; xviii, p. 666; xxiii, p. 171]. The best spring variety available for Kansas is Flynn 1; it shows some resistance to *Helminthosporium*, but is susceptible to smut.

Among winter varieties, Wong and Sunrise resist mildew, but the latter is quite susceptible to loose smut and rust, Calhoun resists mildew, stripe, and *U. nigra* [ibid., xxii, p. 351], Marett Awnless 1 resists mildew and stripe, Smooth Awn 86 is moderately resistant to mildew, covered smut, and *U. nigra*, Jackson is reported to be resistant to leaf blotch and *U. nigra* and moderately resistant to stripe, while Fayette is moderately resistant to mildew and brown rust.

Stanton (T. R.). **Disease-resistant Oats.**—*Yearb. Agric. U.S. Dep. Agric., 1943–1947*, pp. 395–402, 1 pl., 1947.

The author briefly recounts the history of the development of oat varieties resistant to crown rust [*Puccinia coronata*: *R.A.M.*, xxiv, p. 445; xxvi, pp. 196, 288] and to certain smuts [*Ustilago avenae* and *U. kolleri*: ibid., xxiv, p. 446; xxv, pp. 385, 554]. Of the most recently developed varieties, Clinton has proved superior to Tama, Boone, Cedar, and Vicland in Iowa because of its greater resistance to crown rust, stem [black] rust [*P. graminis*], leaf spot [*Pyrenophora avenae*], and lodging, and its higher yield and test weight. Benton is similar in its reaction to the rusts and smuts, though slightly less productive. Eaton, from an Iogold–Bond [ibid., xxiv, p. 498] cross, is resistant to crown rust, black rust, and smuts. Bonda, developed from a Bond–Anthony cross [loc. cit.], is highly resistant to crown rust, black rust, and smuts, while Mindo, from the cross Bond × Double Cross B [loc. cit.], has the same resistance to the rusts and smuts as Bonda.

Among winter oats, important in the south, Traveler is a promising new variety resistant to crown rust. Varieties of red oats that resist crown rust and smut, originating from crosses of Victoria and Fulghum-type oats [ibid., xxiv, p. 186], are Quincy Red (Quincy No. 1) [ibid., xxiii, p. 98] and Fultex. Some of the widely grown southern early red oats with resistance to crown rust and smut have been developed from crosses between Victoria and Fulgrain, resistant only to the smuts. Fulgrain (strains 4, 5, 6, 7, and 8) and Victorgrain [ibid., xxi, p. 252] have substantially contributed to the agricultural wealth of the south.

Red oat varieties with resistance to crown rust and smut, originating from a cross between Nortex and Victoria, include Rangler [loc. cit.], Carolina Red, Ranger, and Rustler [ibid., xx, p. 357].

Quincy Gray originated as a selection from a cross of Victoria–Norton × Red Rustproof [ibid., xxii, p. 383]; it resists crown rust and smut, but is grown only to a limited extent. Verde, from a back cross involving Red Rustproof and Victoria Richland, is resistant to both rusts and smuts. Camellia [ibid., xxiii, p. 98], the only named variety of commercial red oats developed for the south from Bond crosses, is even more resistant to crown rust than Bond and also carries resistance to some smuts.

The offspring of Victoria have markedly improved the economic status of oats as a farm crop; losses from disease have been considerably reduced, and, in general, higher yields of better quality have been obtained. The varieties of Victoria parentage, however, are susceptible to a new *Helminthosporium* blight [*H. victoriae*: see next abstracts] which has also been found on timothy [*Phleum pratense*] and other grasses. The new varieties developed from Bond crosses are resistant to this disease.

Meehan (Frances) & Murphy (H. C.). **Differential phytotoxicity of metabolic by-products of Helminthosporium victoriae.**—*Science*, cvi, 2751, pp. 270–271, 1 fig., 1947.

The authors' suggestion that *Helminthosporium victoriae* [*R.A.M.*, xxvi, p. 389] produces a toxic substance was confirmed in inoculation tests on oats with sterilized mycelium and filtered extracts from cultures. A powerful toxin which caused the characteristic foliar striping or discoloration was detected. The cultures were grown for 30 days in Richards's solution and the filtrate, in a series of dilutions, was used in place of the nutrient solution in which Boone and Clinton oat seedlings had been growing. At dilutions of 1 in 90 or less the leaf blades of Boone seedlings became rigid within 40 hours, and after 48 hours showed slight twisting. At 1 in 45 or less the leaves turned dull greyish-brown after 52 hours; necrosis followed. Clinton seedlings remained unaffected. The Richards's solution alone, minus the amount of sugar equivalent to that used by the fungus in growth, was harmless to the susceptible plants. The toxin occurs in the cells of *H. victoriae* as well as in the nutrient medium. Leaves of susceptible oat varieties were killed when sprayed with a water suspension of sterilized blended mycelium containing no culture substrate. The toxic substance withstood autoclaving for 20 minutes at 15 lb. pressure.

It seems that *H. victoriae* is a weak parasite which needs the help of a toxic secretion in advance in order to infect healthy tissue even of susceptible oat varieties.

Hamilton (D. G.) & Broadfoot (W. C.). **The new Helminthosporium blight of Oats found in Ontario.**—*Sci. Agric.*, xxvii, 9, pp. 446–447, 1947.

In June 1947, *Helminthosporium victoriae* [see preceding abstracts] was discovered in the plots of the Cereal Division, Central Experimental Farm, Ottawa, and later found in the Ontario districts of Fournier, Kemptville, Guelph, Harrow, Blenheim,

Chatham, Wallaceburg, and Toronto. A footnote reports its occurrence in Quebec, New Brunswick, and Manitoba.

Seed treatment with an organic mercury fungicide is recommended for all oat varieties grown in Ontario which have Victoria in their parentage, such as Beacon, Garry, and Vicland. Up to 75 per cent. severe infection occurred in fields of Beacon oats grown from untreated seed. Fields near by grown from treated seed showed only a trace.

Sukhov (K. S.) & Vovk (A. M.). Закукливание культурных злаков и пути его распространения в природе. [Zakuklivanie (pseudo-rosette) of cereal crops and its dissemination in nature.]—47 pp., 22 figs., Leningrad, Publishing Department U.S.S.R. Academy of Sciences, 1940. 1 rouble, 75 kopeks. [Received 1947.]

This is a full account of the authors' studies on the 'zakuklivanie' [pupation] disease of oats [*R.A.M.*, xx, p. 155], most of which has already been reported in this *Review*. Experiments showed that among oat species *Avena sativa* is the most susceptible to the disease (58 per cent. infection) and *A. strigosa* the least (9·2 per cent.). A list of 34 susceptible oat varieties and species is appended.

Fricke (E. F.). **Molybdenum deficiency in Oats.**—*J. Aust. Inst. agric. Sci.*, xiii, 1–2, p. 75–76, 1947.

In the Sheffield district of northern Tasmania Algerian oats, in certain well-defined areas, have an abnormality known locally as 'blue chaff disease'. The outer glumes of the affected plants become bluish and the grain is pinched. The disorder occurs in irregular patches throughout a paddock and when widespread the whole crop must be cut for hay. It does not occur every year, but is always found in the same locality, even after long intervals. Late-sown crops of Algerian oats are more susceptible than the early [cf. *R.A.M.*, xxiii, p. 174; xxv, p. 36]. Molybdenum was applied on two properties during the last two seasons and the oats made normal growth. Plants treated with 2 oz. per acre sodium molybdate contained 0·3 p.p.m. of molybdenum and the grain 0·24, whereas the blue chaff oats contained 0·15 and 0·09 p.p.m., respectively. The addition of molybdenum also caused a marked improvement in associated red clover [ibid., xxiv, p. 105].

Semeniuk (G.), Nagel (C. M.), & Gilman (J. C.). **Observations on mold development and on deterioration in stored yellow dent shelled Corn.**—*Bull. Ia agric. Exp. Sta.* 349, pp. 225–284, 1 fig., 5 graphs, 1947.

Mould development was studied in yellow dent shelled maize stored in steel bins of 1,000 to 2,740 bush. capacity during autumn, 1940 [*R.A.M.*, xxvi, p. 196]. In August and September, 1941, about 50 per cent. of 58 bins showed mould development, 73 per cent. of 22 bins in March, 1942, and approximately 75 per cent. of 37 bins in April, 1943 [ibid., xxiii, p. 333]. During the first winter period of storage the most prevalent fungus was *Penicillium palitans* with distinct stratifications of *Aspergillus flavus*, *A. candidus*, members of the *A. glaucus* group, and the blue-eye fungi (*P. rugulosum* and *P. chrysogenum*, with *P. palitans* included) [ibid., xxvi, p. 196]. The late summer inspection of 1941 had shown some of these fungi but in less pronounced zones which, however, were heavily intermixed with species of *Mucor*, *Rhizopus*, *Absidia*, *Penicillium*, *Aspergillus*, and other organisms. Blue-eye maize was found on the outer rim of the heavily moulded area; below this, in the drier maize, *A. candidus* and *A. glaucus* species occurred. The maize in the upper 2 ft., where the mould development was prevalent, had generally a higher moisture content. The deterioration of maize as measured by germinability losses

and fat-acidity increases was almost complete in the upper 2 ft. of most bins, but decreased progressively towards the lower parts.

Results of laboratory tests gave the following minimum relative humidities for spore germination: *A. candidus* and *A. amstelodami* 72·5 per cent., *A. niger* 80, *A. flavus* 82·5, *P. chrysogenum* 85, and *P. rugulosum*, *P. palitans*, and *M. racemosus* 87·5. The moulding was slightly earlier and more profuse from 97·5 to 72·5 per cent. relative humidity in a soft, starchy maize than in a hard, flinty type. A relative humidity of approximately 65 per cent. appears to be the lower limit for mould growth on maize. Maize stored in tight metal containers at 20° to 25° C. showed nearly 50 per cent. germinability loss after one year when kept at 14 per cent. moisture content, and complete loss after two years. At 9·7 per cent. moisture maize showed no change during the testing period.

Asthana (R. P.). **Cheap and simple control of grain smut of Sorghum.**—*Mag. agric. Coll. Nagpur*, xxii, 1, pp. 6–9, 1947.

A new method of controlling grain [covered] smut of sorghum [*Sphacelotheca sorghi*: *R.A.M.*, xxvi, p. 197], which has been worked out for the use of cultivators in the Central Provinces and Berar, is described. It can be easily carried out by every cultivator, the seed germination remains unaffected, and the yield is increased by an average of 426 lb. per acre over the control. Some advantages over the dry chemical seed-dressing method [ibid., xxv, p. 31] are that it is very cheap, does not require any chemical or any seed-dressing apparatus, and the seeds remain undamaged even if they are slightly over-treated.

The cold water and solar treatment, as it is called, must be given on hot, clear, sunny days during May and June when the temperature ranges from 100° to 120° F. The seeds to be sown are washed in water and then soaked in cold water at ordinary temperature for ten hours (from 8 p.m. to 6 a.m.) in open vessels. Next morning they are removed and spread out in thin layers on a cow-dung plastered floor or on gunny bags or bamboo matting to dry in the sun until sunset. During this period the seeds should be turned several times. In the evening, when they are thoroughly dried, they should be stored in a sun-heated earthen or metallic vessel or, where these are not available, in gunny bags which have been boiled for half an hour and thoroughly dried. The vessels should be two-thirds full and the mouths covered with a thickly woven cloth or with earthen or metallic lids sealed with a paste of cow dung and mud. Seeds thus stored can be safely preserved for more than two months and can be sown at the end of June or beginning of July. Any surplus seeds can be used for food.

This method has been tried for five consecutive years from 1941 onwards in experiments made with seeds of the Saoner variety which were heavily coated with spores of *S. sorghi* obtained from the previous year's crop. Five seed treatments were given, (1) control (no treatment), (2) copper carbonate dust at the rate of 1 oz. per 30 lb. seed, (3) sulphur dust at the same rate, (4) ten hours' soak in cold water and drying in the sun, and (5) four hours' soaking in cold water and drying in the shade. The percentages of infection in the subsequent crop were 17·1, 1·25, 2·05, 4·86, and 7·25, respectively, and the corresponding grain yields in lb. per acre, 1,150, 1,786, 1,720, 1,676, and 1,520. The prolonged soaking washes away many of the infective spores, and any remaining are induced to germinate in the low temperatures of the early morning and are later killed by the heat of the sun.

Morwood (R. B.). **Diseases of Sorghum.**—*Qd agric. J.*, lxv, 2, pp. 140–142, 1 fig., 1947.

The principal disease affecting sorghum in Queensland is covered kernel smut (*Sphacelotheca sorghi*) [*R.A.M.*, xxi, p. 71], the Kalo variety being especially

susceptible. It can be controlled by seed treatment with copper carbonate, smutol (copper oxychloride) [ibid., xxiii, p. 251], both at 2 oz. per bush., or agrosan or ceresan, both at ½ oz. per bush., and by the use of the highly resistant varieties available. Leaf blight (*Helminthosporium turcicum*) [ibid., xxiv, p. 442] of sweet sorghum [*Sorghum saccharatum*], characterized by roundish, grey spots, and bacterial diseases [unspecified], causing more elongated, red-bordered spots, are both more common in the damper scrub areas.

Soloveva (Mme A. I.) & Polyarkova (Mme L. V.). Вилт Хлопчатника. [Wilt of Cotton.]—Tashkent Agricultural Publishing Department, Uzbekistan Soviet Republic, 63 pp., 12 figs., 5 graphs, 1940. [Received January, 1947.]

In this study on cotton wilt (*Verticillium dahliae*) [*R.A.M.*, xvii, p. 814; xxvi, p. 450] the authors state that the widespread and increasing occurrence of the disease causes serious damage to the cotton crops of the U.S.S.R., the losses in the non-resistant varieties being as high as 40 to 60 per cent. Examinations showed that *V. dahliae* inhabits the soil, living on organic matter. Temperatures of —30° and 80° C. did not inactivate the fungus, while growth and germination of the microsclerotia were observed at temperatures ranging from 7° to 32° at 20 per cent. soil humidity, though increased moisture greatly stimulated their growth. *V. dahliae* attacks 27 different plants in Central Asia; cereals were found to be immune. The transmission of the disease by seeds appeared to be negligible.

Investigations during 1933–4 showed that lucerne is an extremely powerful wilt-reducing factor. Cotton grown in fields previously planted with lucerne showed only 6·2, 2·56, and 3 per cent. infection, whereas the controls showed 57·3, 50·6, and 43·8 per cent., respectively. In 1937 the variety 36M2 showed 27·5 per cent. infection after the use of fertilizers compared with 48 per cent. for the control. Dung had no marked effect on resistant varieties, non-resistant ones showed some increase of wilt after its application. The varieties Vakkona, 0208, 8797, 0214, and 4268 are resistant.

Dutky (S. R.). **Preliminary observations on the growth requirements of Bacillus popilliae Dutky and Bacillus lentimorbus Dutky.**—*J. Bact.*, liv, 2, p. 267, 1947.

Bacillus popilliae [*R.A.M.*, xxiv, p. 415] was maintained under continuous cultivation on artificial media for a year with high vegetative yields, but no sporulation. Cultures carried through numerous transfers gave typical A type milky disease symptoms with abundant sporulation when injected into Japanese beetle [*Popillia japonica*] larvae. Best growth was made at pH 7·5 in highly buffered, strongly reducing media. Thiamine was essential, about 0·003 μ gm. per 10 ml. of medium giving good growth. Preliminary tests indicated that *B. popilliae* may be useful for the assay of minute amounts of thiamine. *B. lentimorbus* [ibid., xxii, pp. 137, 480] was similarly cultured.

Newhook (F. J.). **The detection of browning (Polyspora lini) and wilt (Fusarium lini) in seed-lines of linen Flax.**—*N.Z. J. Sci. Tech.*, A, xxix, 1, pp. 44–48, 3 figs., 1947.

The New Zealand method for the detection of *Polyspora lini* in seed lines of linen flax [*R.A.M.*, xxi, pp. 3, 334] consists in thorough mixing of the sample of some 1,000 seeds, which are placed in a close-mesh wire-gauze cage and vigorously washed for five minutes in running tap water with a final rinse in sterile water; draining off the water; dispersing 40 to 50 of the seeds on the bottom of Petri dishes and covering them with a nutrient agar, preferably composed of 24 gm. prune and 4 gm. plain agar, 20 gm. each of malt extract and dextrose, and 1,000 ml. water at 45° C.; and incubating for five to seven days at 22°. The pathogen grows out from infected seeds as pale pink or buff-coloured, radially striated colonies,

often turning nearly black with chlamydospore production. In Muskett and Malone's Ulster method [ibid., xx, p. 261] the growth of *P. lini* tends to be inhibited and masked by contamination with saprophytes, which in a comparative test, in fact, reduced the apparent infection of the seed line from 26 to 15 per cent. The Ulster method, moreover, does not differentiate between internal and externally borne infection, while another drawback is that only one side of the seed is in contact with the medium, and after about two days the radicle lifts the seed coat clear of the agar. In the New Zealand method germination does not occur and the seeds, being covered, remain in contact with the substratum.

For the detection of *Fusarium lini* quart jars containing 1½ to 2 in. of wet, washed river sand are autoclaved for one hour at 20 lb. per sq. in., 300 seeds spread over the sand, and the lids loosely replaced. After 48 hours at 27° the jars are transferred to a glasshouse with a temperature of 25° to 30°, where the seedlings reach a height of about 3½ in. and after 20 days or so *F.* spp. with white mycelia develop radially from the stems or ramify closely over the leaves. They are followed by other organisms of quite different appearance, e.g., *Alternaria*, *Botrytis*, and *Rhizopus* spp. The cultural and morphological characters of over 90 per cent. of the isolates from wilt-suspected crops fell within the described limits of *F. lini*. Three methods of inoculation with cultures of this type were compared, viz., (1) the seed was kept for three days at 27° on the surface of potato dextrose agar cultures and then planted in sterilized soil; (2) uninoculated seed was planted in pots, the surface of which had been mixed with a medium consisting of 15 gm. maize meal and 300 gm. sand, moistened with 0·5 per cent. yeast-extract solution, sterilized, inoculated with the *Fusarium* strains, and kept for a fortnight at 27°; (3) eight-day seedlings were dipped in inoculum prepared by Wellman's method [ibid., xix, p. 170] and transferred to boxes of sterilized soil. The following percentages of wilt were obtained by the three methods with strain A (a subculture of Baylis's isolate 3 [ibid., xx, p. 408]): 27, 27, and 100, respectively, while the corresponding figures for strains B and C, and the controls appropriate to each method were 28, 43, and 96, 0, 0, and 0, and 0, 0, and 0, respectively.

Cass Smith (W. P.) & Harvey (H. L.). **Flax seed treatment.**—*J. Dep. Agric. W. Aust.*, xxiii, 3, pp. 207–212, 1946.

Since 1940 practically all flax seed sown in Western Australia, and in certain years also in other flax-growing areas, has been treated with ceresan. As this treatment involved both extra expense and certain practical difficulties and the incidence of seed-borne diseases appeared to be low, the Flax Production Committee requested experiments to be carried out to test the value of seed treatment. The Concurrent flax seed used showed on microscopic examination little or no cracked or broken seed, while a seed test by the Ulster method [see preceding abstract] yielded no trace of *Colletotrichum lini* and only one colony of *Polyspora lini* [*R.A.M.*, xxiv, p. 506] per 100 seeds. Germination was 84 per cent. and was not deleteriously affected by any treatment [ibid., xxvi, p. 339]. The seed treatments used in the experiments were 8 per cent. ceresan U. 564 at 1 gal. per cwt. and nomersan R.D. 7846, agrosan, ceresan U.T. 1875 A, and spergon all at 2 oz. per bush. The first sowings were made between 12th and 16th June, 1945, at five different sites in the flax-growing area, a sixth planting at the University Institute of Agriculture, Perth, and two re-sowings were made on 17th and 18th July. Emergence counts commenced five weeks after planting at all sites. Seed treatment with ceresan [cf. ibid., xxvi, p. 396] and spergon greatly increased the emergence at all sites, ceresan wet and nomersan at five, and agrosan at only one. The average results for all sites were: ceresan U. 564 52·6 per cent. emergence and 41·8 per cent. plant stand at the flowering stage; nomersan 53·1 and 44·1, agrosan 41·8 and 36·6, ceresan U.T. 1875 A 61·8 and 51, spergon 59·5 and 49·5, and control

36 and 32. The significant differences in plant numbers at the emergence stage were still maintained at flowering, with the exception of the agrosan treatment.

Isolations obtained from rotted seeds and young seedlings in the control rows yielded fairly consistently *Pythium* spp. and a *Phytophthora* sp.

The experiments prove that treatment ensured a more effective utilization of the seed and better stands, especially under conditions when damping-off occurs. These benefits seem to outweigh the cost of treatment. Ceresan U.T. 1875 A, which proved to be one of the two most effective dusts, has been generally used in Western Australia for pickling commercial flax seed. It is cheaper than spergon, which is equally effective.

Millikan (C. R.). **Zinc toxicity in Flax grown in a wire netting 'bird cage'.**—*J. Aust. Inst. agric. Sci.*, xiii, 1–2, pp. 64–67, 2 figs., 1947.

Flax plants grown at Burnley Gardens in a galvanized wire cage (for bird protection) in grey, sandy loam (pH 6) showed symptoms of zinc toxicity. The disorder occurred in some summer sowings, but it was most severe in the very wet and cold winter months. The plants were dwarfed, with or without a marked chlorosis and rosetting of the plant apex. Later necrosis of the lower leaves occurred starting at the tips, or appearing as spots on the lower surface. The primary stem usually died from the top, fresh shoots forming from the basal node. In warm and dry spring weather the plants may recover. Soil treatment with 1 ton hydrated lime per acre prevented the disorder, whereas sulphur and zinc sulphate rendered it more serious. Spraying the chlorotic plants with a 0·5 per cent. solution of iron sulphate resulted in a temporary development of normal green leaves, but the general growth remained stunted.

In water-culture experiments symptoms identical with those in the 'bird cage' were produced by the addition of excess zinc to the nutrient solution. Top necrosis was prevented by adding iron as well, but the plants remained dwarfed. The zinc toxicity resulted in serious reduction of root development. The plants in the 'bird cage', especially the chlorotic ones, had a very high zinc content while the iron concentration was actually higher in the chlorotic than the non-chlorotic plants. It seems that its utilization in the tissues was unfavourably affected by the excess zinc.

Vanterpool (T. C.). **A seedling blight and leaf spot of Flax caused by Coniothyrium olivaceum Bon.**—*Canad. J. Res.*, Sect. C, xxv, 1, pp. 54–58, 6 figs., 1 pl., 1947.

During 1945 and 1946 *Coniothyrium olivaceum*, which has hitherto been reported on flax only in Argentina [*R.A.M.*, xvii, p. 187], was found to be the cause of a seedling blight of flax in Saskatchewan. Twelve out of 32 low-germination seed samples from the 1945 crop bore an average infection of 8 per cent. Leaf spot lesions were observed during late August, 1946. The wide distribution of the fungus suggests that it has been present in the Province for some time but the damage it causes on flax is of minor importance. Pycnidia develop abundantly in culture. The spores measure 7·5 to 10 (11·5) by 4·2 to 7·5 μ, averaging 9·1 by 6 μ which, although somewhat larger than the average for the species, is within the range limits. The disease is favoured by high moisture and probably cool temperatures.

Magee (C. J.). **Population and agriculture of South-East Asia.**—*J. Aust. Inst. agric. Sci.*, xiii, 1–2, pp. 28–33, 1947.

In this Presidential address delivered in February, 1947, to the New South Wales branch of the Australian Institute of Agricultural Science, the author mentions that in British North Borneo Manila hemp [*Musa textilis*] estates were recently severely affected and the crop greatly reduced by bunchy top [abaca bunchy top virus: *R.A.M.*, xxi, pp. 66, 535; xxiv, p. 372], a disease prevalent in the Philippines.

It is now suggested that the abaca virus, which had not previously been known to attack bananas, is identical with the banana bunchy top virus, because in the North Borneo outbreak some bananas growing in the abaca plantations were infected with bunchy top. The bananas concerned, however, possess a much higher degree of bunchy top resistance than does abaca. The disease was first reported on abaca in British North Borneo in 1940 and it has spread to all estates on the southern side of the Semporna Peninsula. One estate of about 2,000 acres on the northern side of the peninsula, isolated by 24 miles from the infected area, is still free from the disease, and it is hoped that eradication of infected plants will help to re-establish the industry. Infected plants are not a total commercial loss, as much of the fibre can be harvested as eradication proceeds.

BAWDEN (F. C.) & KASSANIS (B.). **Primula obconica, a carrier of Tobacco necrosis viruses.**—*Ann. appl. Biol.*, xxxiv, 1, pp. 127–135, 1947.

The occurrence is recorded of a tobacco necrosis virus [*R.A.M.*, xxvi, p. 358] in the leaves and flowers of two naturally infected *Primula obconica* plants, found in a nursery in Folkestone. The plants appeared quite healthy, but sap from them induced on tobacco, *Nicotiana glutinosa*, and cucumber white, necrotic local lesions. The virus produced by further inoculations from these lesions was used for inoculating French bean (*Phaseolus vulgaris*) [ibid., xxv, p. 188], resulting in the dark and spreading necroses characteristic of tobacco necrosis for which, it appeared, *Primula obconica* was a systemic host. Its properties and serological relationships showed the virus from *P. obconica* to be related to one of the tobacco necrosis viruses. The virus from *P. obconica* was purified several times but it consistently failed to produce crystals in conditions in which the viruses called by Bawden and Pirie [ibid., xxii, p. 377] tobacco I and tobacco II readily crystallized.

Sap inoculations to French bean suggested that the virus was irregularly distributed in the plants and occurred only in isolated areas often far removed from one another. Healthy *P. obconica* seedlings were inoculated with three tobacco necrosis viruses, all of which entered and multiplied locally, no symptoms being produced, and the virus rarely recovered from the uninoculated leaves. On the rare occasions when movement from the inoculated areas occurred it resulted in a further localized infection and no full systemic infection. The viruses multiply much more slowly in *P. obconica* than in tobacco or French bean which react necrotically. The virus distribution in the roots was as irregular as in the aerial parts, and there seems to be little movement from the point of entry. The view that the total virus content in infected roots indicates the number of separate local infections is in keeping with the wide range of virus content found in different parts of the same root and with the fact that different tobacco necrosis viruses can be found in the roots of one plant.

Infected *P. vulgaris* and *P. malacoides* behave in much the same way as does *P. obconica*. Inoculation of seedlings of these species with three unrelated tobacco necrosis viruses resulted in local multiplication of the viruses without production of symptoms, but no virus was recovered from uninoculated leaves of the five plants tested.

In conclusion the authors discuss the possibility of the viruses being seed-borne and point out the difficulty of determining their origin in the absence of a technique for detecting their presence in small quantities.

CHRISTIE (J. R.). **Preliminary tests to determine the nematocidal and fungicidal properties of certain compounds when used as soil fumigants.**—*Proc. helminth. Soc. Wash.*, xiv, 1, pp. 23–28, 1 fig., 1947.

Of the chemical compounds used in parallel tests at the Plant Industry Station, United States Department of Agriculture, Beltsville, Maryland, for the control of

the root knot nematode (*Heterodera marioni*) and the causal organism of aster wilt (*Fusarium oxysporum* f. *callistephi*) [*F.o.* f. 6: *R.A.M.*, xxv, p. 454], chloropicrin and allyl bromide (1 or 2 c.c. per fumigating box, 4 by 4 by 4½ in., filled with sand) were outstandingly superior to all others in their action on the fungus. Mixtures containing dichloropropene (D–D and dowfume–N) were slightly to moderately fungicidal.

WOLF (F. A.). **Twig blight of Golden Bell, Forsythia viridissima Lindl.**—*Plant Dis. Reptr*, xxxi, 9, p. 325, 1947. [Mimeographed.]

A blight, caused by *Sclerotinia sclerotiorum*, has been observed for the first time on twigs of *Forsythia viridissima* near Durham, North Carolina. It appeared shortly after the cessation of flowering as sunken, discoloured lesions girdling the twigs and killing the parts distal to them. The cortical tissues of the lesions were full of hyphae and readily yielded cultures. The fungus also causes a blossom blight of *F. viridissima*, gaining entrance to the twigs by way of the flowers.

BAKER (H. G.). **Infection of species of Melandrium by Ustilago violacea (Pers.) Fuckel and the transmission of the resultant disease.**—*Ann. Bot., Lond.*, N.S., xi, 43, pp. 333–348, 3 figs., 1947.

After reviewing critically the different views that have been put forward concerning the method of infection of species of *Melandrium* [syn. *Lychnis*] by *Ustilago violacea* and its transmission, the author describes laboratory and garden experiments, with field data, which prove that the theory of seed transmission is incorrect, and that true flower infection is most frequent in nature. In one experiment, plants of *M. dioicum*, *M. album*, and the F_1 hybrid between them were transferred to pots in the greenhouse in the early summer of 1942. Spores of *U. violacea* from flowers of infected *M. album* plants and from a back-cross *M. dioicum* hybrid were dusted on the stigmatic surfaces of open flowers, pollination being also effected. The seeds from the resulting capsules had no smut spores on the seed coat, and no spore formation was observed in the capsules. The seeds were sown immediately and on the many plants produced no smutted flowers occurred. In nature, when ovaries are invaded, the ovules always abort. Other work showed that pollinating insects convey the spores from one host to another, infection of the new host taking place later through some portion of the flower. Infection of seedlings and axillary buds may also occur [*R.A.M.*, xviii, p. 783].

In both *M. dioicum* and *M. album* infection appears to be most severe where the host is most common. This is related to the means of transmission of the fungus and the probable existence of two strains each of which infects one species only. With *M. album* infection is most marked in undisturbed localities and least marked in cultivated fields.

RHOADS (A. S.). **An unusual case of Clitocybe root rot in Ficus elastica propagation stock in a Florida nursery.**—*Phytopathology*, xxxvii, 7, pp. 523–524, 1947.

In June, 1944, the writer investigated an outbreak of mushroom root rot (*Clitocybe tabescens*) [*R.A.M.*, xxiv, p. 435; xxv, p. 183] in a ⅔-acre planting of *Ficus elastica* and its var. *variegata*, grown in Florida for propagation of the tips for the northern trade. The disease was stated to be progressively worsening and was estimated to have killed 20 to 25 per cent. of the original stock, as well as some of the newly set. Many of the plants were found to be completely girdled by the fungus, but they survived through the development of adventitious roots above the girdled bases, from which numerous fresh sporophore clusters had arisen. Infection was much more prevalent on the higher portion of the sloping planting than elsewhere. At the time of inspection healthy rooted tips were worth 20 cents apiece wholesale and an average of five a year was produced by each plant, so that the loss involved was considerable. Infection by *C. tabescens* was no doubt

promoted by the daily sprinkling of the plants to keep the moss layers wet. By 20th January, 1947, the root rot had become so severe that the cultivation of india-rubber figs in that particular location was no longer profitable and they were consequently destroyed and replaced by other plants.

Tysdal (H. M.). **Breeding better Alfalfa.**—*Yearb. Agric. U.S. Dep. Agric., 1943–1947*, pp. 433–438, 1 pl., 1947.

In the past few years two lucerne varieties have been produced in the United States which are resistant to bacterial wilt (*Corynebacterium insidiosum*) [*R.A.M.*, xxv, p. 215; xxvi, p. 495], Ranger and Buffalo. The former originates from selection within Turkistan, Cossack, and Ladak. It is slightly more susceptible to leaf spot diseases [including *Pseudopeziza medicaginis*] than Grimm or Hardigan. Buffalo surpasses its parent Kansas Common in wilt resistance. At the Iowa Agricultural Experiment Station, Buffalo produced 3·6 and Ranger 3·55 tons per acre in the third year of production, as against 2·5 and 1·5 for Grimm and Baltic, respectively. Similar results occurred wherever bacterial wilt was present; where the disease was unimportant, Ranger and Buffalo gave about the same yield as an ordinary variety.

Atlantic, a vigorous, high-yielding variety, suitable for eastern areas, is rather more tolerant of bacterial wilt than the standard varieties. Nemastan is resistant, but is not recommended for use anywhere in the eastern States, as it is susceptible to leaf spots.

Black (L. M.). **Virus tumors in plants.**—Preprinted from Sixth Growth Symposium, pp. 79–84, 2 figs., 1947.

The wound tumour disease caused by the virus *Aureogenus magnivena* [clover big vein virus: *R.A.M.*, xxiv, p. 511] is, as a rule, a systemic disease, but sometimes it remains localized in a part of a plant, usually the roots, for months. Old root tumours rot and hardly any root system is left in advanced stages of the disease. Microscopic examinations of the tumour tissue showed disorganized cells arranged sometimes in whorls with many centres of growth, each of which may be delineated by meristematic cells and a layer of crushed cells. The diseased tissue contained no organisms.

Experiments confirmed that wounds play an important part in starting the tumours; the age of the wounded tissue also appears to be an important factor. From 387 pin punctures on virus-infected sweet clover [*Melilotus alba*] stems 175 tumours developed, but none developed from 505 wounds on virus-free plants. When sweet clover grown from commercial seed was inoculated with the clover big vein virus the tumours that developed varied greatly in number and size. When different clones were inoculated the tumour reaction within each clone was uniform but differed widely in different clones. The leafhopper vectors *Agalliopsis novella* and *Agallia constricta* must retain the virus for several days before they become infective.

Ergot in Paspalum.—*Agric. Gaz. N.S.W.*, lviii, 7, pp. 344–346, 3 figs., 1947.

Paspalum ergot [*Claviceps paspali*: *R.A.M.*, xxvi, p. 246] has occurred regularly in New South Wales every summer since its first appearance there in 1935 [ibid., xv, p. 724]. If the grass is not kept short the sticky secretion from the seed heads damages the clothing of urban dwellers. The ergot fungus is parasitized by a *Cerebella* and by a *Fusarium* sp., the former making a black, wrinkled crust and the latter a smooth, bright, salmon-red layer over the seed head at the 'honey-dew' stage, and preventing the formation of the ergots. Experiences from many countries have shown that the conidial 'honey-dew' phase is harmless to stock but ill effects follow when cattle eat the mature ergots. Stock owners should become conversant with the malady as sickness due to ergot ingestion is quite common.

Evreinoff (V. A.). **Le Caroubier ou Ceratonia siliqua L.** [The Carob tree or *Ceratonia siliqua* L.]—*Rev. Bot. appl.*, xxvii, 299–300, pp. 389–401, 1947.

In this account of the carob tree (*Ceratonia siliqua*) and its cultivation the author states that the commonest disease affecting this host wherever it is grown is *Oidium ceratoniae* [*R.A.M.*, xvii, p. 533; xxv, p. 397]. The disease attacks the young leaves, which fall prematurely, and occasionally the flowers and young fruits. The tree becomes exhausted and takes two years to recover. Treatment consists in sulphur applications while dew is present, made several times during spring, or potassium pentasulphide (200 gm. per 100 l. water) may be applied in winter and spring. Carob trees planted in unsuitable soil often bear on the trunks and large branches fructifications of *Polyporus* [*Fomes*] *igniarius* and *P. sulphureus* var. *ceratoniae*.

[Pentzer (W. T.).] **Ultra-violet ray not a fruit saver.**—*Calif. Citrogr.*, xxxii, 11, p. 501, 1947.

Recent tests made in California and Washington have shown that ultra-violet rays [*R.A.M.*, xxv, p. 400; xxvi, pp. 310, 558] give poor control of fruit decay caused by fungi, as the spores remain viable on the fruit surfaces not exposed to the rays. Ten-minute exposure of peaches 6 in. from ultra-violet lamps gave only a partial kill of the common rot organisms.

Gilliver (K.). **The effect of plant extracts on the germination of the conidia of Venturia inaequalis.**—*Ann. appl. Biol.*, xxxiv, 1, pp. 136–143, 1947.

Under the experimental conditions used, 23 per cent. of the 1,915 flowering plants tested gave extracts which completely inhibited the germination of the conidia of *Venturia inaequalis*. Those giving active extracts were distributed throughout the Angiosperms, there being no correlation with systematic position.

Extracts from *Cornus sanguinea*, *Ranunculus ficaria*, *Chrysanthemum segetum*, and *Raphanus raphanistrum* were largely fungistatic, those from *Anemone nemorosa*, *Atriplex patula*, *Clinopodium vulgare*, ivy, onion, *Pimpinella saxifraga*, primrose, *Salix purpurea*, and snowberry were apparently fungicidal. When the plants were dried at room temperature *Lonicera periclymenum*, snowberry, *P. saxifraga*, parsnip, *R. raphanistrum*, and *Hieracium boreale* soon lost their inhibitory properties, while charlock, *Chrysanthemum segetum*, *Bellis perennis*, *Anemone nemorosa*, *Ranunculus ficaria*, *Atriplex patula*, *Clinopodium vulgare*, and *Cornus sanguinea* remained active, in some cases, for several months.

Louw (A. J.). **Fusicladium of Apples.**—*Fmg S. Afr.*, xxii, 257, pp. 679–683, 1 fig., 1947.

As a result of the increased planting of apple trees in the winter-rainfall area of South Africa, outbreaks of *Fusicladium* [*Venturia inaequalis*: *R.A.M.*, xxvi, p. 32] now occur annually in districts where the disease had not previously been known. The Cape orchards were already threatened as long ago as 1905. The disease spreads from one farm to another most probably on infected leaves present on nursery trees and in packing material. Farmers acquiring young apple trees for farms hitherto unaffected should destroy all leaves and packing material before planting. At farms where the disease is already present, all apple trees should be sprayed to prevent infection during the growing season. In some years infection is so slight that farmers consider spraying unnecessary, and the consequent omission of spraying has invariably proved disastrous in years of epidemic outbreaks.

A survey of the incidence of infection in the Western Cape Province from 1941 to 1944 indicated that the disease is particularly prevalent in Elgin and the Koue Bokkeveld in the district of Ceres, the two chief apple-growing districts in the

winter-rainfall area. It was usually more severe in the Koue Bokkeveld than in Elgin, where only in 1943–4 did it cause more damage. In the four years, it occurred only slightly in the Koo in the Montague district, while at Villiersdorp it was present only during one year. In the Koue Bokkeveld, the winter and summer temperatures are generally lower than at Elgin, and the more severe incidence in the former area may be attributable to this. At Villiersdorp the disease is probably restricted by high temperatures.

The data show no direct relation between rainfall in the different areas and the incidence of the disease. In 1941, the disease was only slight in Elgin in spite of heavy spring rains, though in the same season it was fairly prevalent in the Koue Bokkeveld in spite of low rainfall.

During the past few years, outbreaks have unquestionably tended to become more severe. Between 1938 and 1941, only two individual cases of serious losses were recorded, in spite of the fact that growers were rather lax about spraying. The data indicate that the increased incidence of the past few years is not related to the corresponding higher rainfall; it appears that there are other factors which may predominate over the effect of wet conditions.

Five years' observations in various parts of the area indicated that the least susceptible varieties grown locally are Winesap and Rokewood, while there is no doubt that the most susceptible are White Winter Pearmain and Red Delicious. The apparent resistance of some varieties is to be ascribed to their late foliation, at a period when moisture and temperature conditions are less favourable to infection. This view is confirmed by the fact that one and the same variety may show different degrees of susceptibility in different areas.

No uniform policy for control can be established for all circumstances. In orchards sporadically subject to attack it is unwise to delay spraying pending the appearance of the disease. In the case of localities and varieties that are never affected, the grower himself must decide whether to spray or not.

Yossifovitch (M.). Заштит Шљиве од **Puccinia pruni-spinosae Persoon** и од **Taphrina pruni (Fuck.) Tul.** [Protecting Plum trees from attack by *Puccinia pruni-spinosae* Persoon and *Taphrina pruni* (Fuck.) Tul.]—*Ann. Trav. agric. sci., Belgrade*, N.S., i, 1, pp. 3–10, 1946. [French summary.]

Investigations into the control of *Puccinia pruni-spinosae* [*R.A.M.*, xviii, p. 259; xxvi, p. 113] on the four most important varieties of plum-tree at Kosmaj, Yugoslavia, were continued in 1939. Applications of 1 per cent. Bordeaux mixture were made on 26th April, 17th May, and 10th June, six combinations of treatment being used and each group of trees receiving one or more applications. There was no sign of the rust at the time of the third application. In mid-September over half the leaves had fallen from the trees used as controls, those remaining being badly rusted. The June application gave the best degree of protection to the trees, the other two being insufficient. This result was confirmed in 1940 and was in agreement with the 1938 tests. From these results it can be seen that the primary infection commences in earnest not earlier than the beginning of June, and that a single spray applied during the first half of June gives almost complete protection from attacks by *P. pruni-spinosae*. Applications made just after the flowering period are of great importance in controlling *Taphrina pruni* [ibid., xxvi, p. 186], which in some years causes considerable losses in Yugoslavia, destroying four-fifths of the plum crop over large areas, some orchards being almost entirely denuded of fruit. According to data obtained in 1939 the appearance of the majority of infected fruit can be checked by one application of Bordeaux mixture (1·5 per cent. copper sulphate) immediately after flowering. Later applications are quite ineffective. As this post-blossom copper treatment is also effective in controlling *Polystigma rubrum* [ibid., xvi, p. 392; xxv, p. 457], the other serious plum disease

in Yugoslavia, it is essential that it should be adopted as an annual routine measure in plum orchards.

Christoff [Khristov] (A.). Шарката по Сливите. [Plum pox disease.]—*Bull. Chambre Cult. nat. Sofia, Sér. Biol., etc.*, i, 2, pp. 261–296, 2 figs., 1947. [English and Russian summaries.]

Continuing his studies on plum pox disease [*R.A.M.*, xviii, p. 745], to which the author gives the name *Annulus pruni* (syn. *Marmor persicae* [peach mosaic virus]), he records damson, *Prunus triloba*, and wild plum (*P. cerasifera*) as additional hosts of this disease: cherries, peaches, and almonds are not affected. Plum pox is widespread in Bulgaria and Yugoslavia from the Danube to the Greek frontier and from the rivers Sava and Drina in Yugoslavia to Stara-Zagora in east Bulgaria. All plum-growing areas in both countries are affected, most of them very severely. Generally the only signs of infection are the mottled leaves, but the disease causes fruit drop 30 to 40 days before ripening, and very little fruit remains on the infected trees. Most of the diseased fruit is pocked, with discoloured, gummy pulp underneath, and contains more organic acids and less sugar, especially sucrose, than healthy fruit. Fruits of susceptible varieties are smaller, with a high stone-pulp ratio. Diseased apricot trees are more susceptible to winter injury than healthy ones. The incubation period in all hosts is from 9 to 13 months.

The susceptibility of 24 plum and 12 apricot varieties has been tested experimentally. Different degrees of infection (from severe pox to no visible symptoms) occurred on the fruits of different varieties. Highly susceptible plum varieties were Queen Bosnia, Dolaner Zwetschke, Italian plum, Queen Victoria, King Dushan, Kustendil, Early Reineclaude, Ostava local plum, and Shameria. The following varieties were practically resistant: Anna Späth, Bühler Frühzwetschke, Yellow and Red Afuska (*P. cerasifera*), Big Sugar Prune, Prune d'Agen, Grosse Reineclaude, Mirabelle Précoce, Montfort, Violette Reineclaude, Early Reineclaude, Early Red Mirabelle, Rivers Early, Belle of Louvain, Czar, and Red Myrobalan (Malvasinka). Susceptible apricot varieties, in decreasing order of susceptibility, were White Large Early, De Versailles, Aleko Pasha, Mush large, Golden Yellow, apricot from Leskovetz, and La France. A Mandoela Dolce and Ungarische beste Apricose produced healthy fruits in spite of leaf mottling.

The disease is not seed transmissible. The aphid *Anuraphis helicrisii* is the vector. Transmission is easily obtained by budding and grafting. White, red, yellow, and green light had no influence on the disease, but no symptoms appeared on leaves exposed to blue or violet light.

Early Reineclaude and *P. cerasifera* carrying *Prunus* virus 6 [plum dwarf virus] were not infected by inserting pox-diseased plum buds. Buds from these budded Early Reineclaudes inserted into healthy trees of the same variety developed only the symptoms of plum dwarf virus. The same results were obtained with scions from a *P. cerasifera* symptomless carrier of plum dwarf virus, previously unsuccessfully inoculated with plum pox.

The control measures recommended are the destruction of diseased trees and use of resistant varieties.

Hutton (K. E.). **Diseases of Cherries.**—*Agric. Gaz. N.S.W.*, lviii, 7, pp. 369–373, 392, 9 figs., 1947.

The principal diseases affecting cherry trees and fruit and causing annual losses in New South Wales are brown rot (*Sclerotinia fructicola*) [*R.A.M.*, xxiv, p. 128], shot hole (*Clasterosporium carpophilum*) [ibid., xxii, p. 422; xxvi, p. 186], rust (*Puccinia pruni-spinosae*) [ibid., xxi, p. 244; xxvi, p. 113], bacterial canker (*Pseudomonas cerasi* var. *prunicola*) [*P. prunicola* and *P. mors-prunorum*: ibid., xxv, p. 565], crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*) [ibid., xviii, p. 603],

various wood rots, *Armillaria* root rot (*A. mellea*) [ibid., xxiv, p. 318], waterlogging, sun scald, and other gumming and decline disorders. Control measures for all these diseases are indicated.

LOTT (T. B.). **'Small bitter cherry', a fruit abnormality of the Bing Cherry variety.**—*Sci. Agric.*, xxvii, 6, pp. 260–262, 1 fig., 1947.

A fruit abnormality of Bing cherry trees known as 'small bitter cherry' has been observed for several years in the Okanagan Valley of British Columbia. The disorder affects only the shape and size of the fruits, some of which are normal in every respect while others are less than half the normal size, regular in shape, oval in side view, and round when viewed from the distal end. At picking time they are bright red and have a bitter or objectionable taste. They hang on the tree until later in the season when they taste less bitter but somewhat fermented. The number of affected cherries in the crop varies; usually normal and abnormal cherries are found on the same tree. 'Small bitter cherry', which was first observed in 1940 on a single Bing tree, has now been seen on eight trees in five orchards, several of these trees having been affected for some years.

The cause of the abnormality has not yet been determined. Transmission tests carried out on various named trees in 1941 and 1942 and again in 1944 with buds and scions from an affected tree gave negative results as all trees bore normal fruit.

'Small bitter cherry' appears to be of little economic importance but is of great consequence to cherry-growers in Okanagan owing to its similarity to the serious virus disease, little cherry [*R.A.M.*, xxvi, p. 440]. Certain characteristics, however, serve to distinguish the two. 'Small bitter cherry' is confined to the Bing variety, the fruit is never tapered in side view or triangular when viewed from the distal end, and there are no intergrades. Little cherry fruits taste flat and off-flavour even when normal in appearance, the cherries are seldom all small on any one branch (as in the case of 'small bitter cherry'), and branches with all normal fruit are only seen usually during the early stages of infection. While little cherry is easily transmitted and the natural spread is extremely rapid, the natural spread of 'small bitter cherry', if it occurs at all, is very slow.

DARROW (G. M.). **Finer Strawberries ahead.**—*Yearb. Agric. U.S. Dep. Agric., 1943–1947*, pp. 293–299, 1 pl., 1947.

In this brief review of recent progress in strawberry breeding in the United States the author lists the following varieties as showing the highest resistance in trials at Beltsville, Maryland, to the diseases named: red stele [red core (*Phytophthora fragariae*): *R.A.M.*, xxvi, p. 96], Aberdeen and *Fragaria chiloensis* selections; leaf spot [*Mycosphaerella fragariae*: ibid., xxv, p. 385], Klonmore, Fairmore, Southland, Fairfax, Midland, and Howard 17; scorch [*Diplocarpon earliana*: loc. cit.], Southland, Fairfax, Howard 17, Dorsett, Redstar, Maytime, Fairpeake, Starbright, and Fairmore; mildew [*Sphaerotheca humuli*: loc. cit.], Marshall and Rockill; yellow plant, Klondike, Fairmore, and Marshall; and virus resistance, Blakemore, Klondike, Howard 17, and Brightmore.

DEMAREE (J. B.) & WILCOX (MARGUERITE S.). **Fungi pathogenic to Blueberries in the eastern United States.**—*Phytopathology*, xxxvii, 7, pp. 487–506, 5 figs., 1947.

This paper represents an attempt to assemble in a single publication the available information regarding the occurrence and distribution of the fungal pathogens of blueberries (*Vaccinium* spp.) in the United States, with special reference to the South Atlantic and Gulf States.

Septoria albopunctata, originally described by Cooke (*Grevillea*, xii, pp. 22–83, 1883) on *V. arboreum*, does not appear to have been collected again or mentioned

in the relevant literature until the writers' isolation of it from greenhouse plants at the Plant Industry Station, Beltsville, Maryland, in 1939. The fungus has since been obtained from *V. australe* in North Carolina and Georgia and from *V. ashei* in Georgia and Florida. The foliar lesions usually correspond to Cooke's description, being small, circular, with white centres and purple borders, but occasionally the interior is tan- or russet-coloured, with a brown peripheral zone, or the spot may be altogether brown. Cooke did not mention the infection of young shoots sometimes observed on the current year's growth. The lesions are larger (up to 5 to 6 mm. in diameter) than those on the foliage, though otherwise similar, being of a tan to grey colour, slightly sunken, encircled by a reddish-brown zone, and commonly enclosing a single pycnidium, rarely four or five. These organs are ovoid, 118 by 90 μ, and the hyaline, straight or curved, 5- to 11-septate, filiform, obclavate to fusiform pycnidiospores, often provided with a long, attenuated apical segment, measure 42 to 96 by 3 to 4·8 (average 70 by 3·6) μ in the host tissues and about twice the length on maize meal agar. The average length of the sporophores is 12 μ. Inoculation experiments with aqueous pycnidiospore suspensions were successful on the Cabot and Rubel varieties of *V. australe*, June and Rancocas (*V. australe* × *V. angustifolium*), Wareham (*V. corymbosum*), and seedlings of *V. alto-montanum*, *V. ashei*, *V. myrsinites*, *V. lamarckii*, and *V. ovatum*.

Dothichiza caroliniana n.sp. forms on *V. australe* leaves in North Carolina irregular, dark-brown spots, 2 to 3 mm. in diameter, later paling to light brown or grey in the centre and often developing after midsummer a secondary necrotic area round the original lesion. The brown band encircling the latter persists, so that the final appearance is of a large, necrotic area to one side of or surrounding a smaller spot, suggesting the name of 'double spot' as a common designation for the disease. Each spot is occupied by one or two, occasionally four or five black, conical to irregular pycnidia, 80 to 130 by 48 to 95 μ. The hyaline, continuous pycnidiospores with obtuse ends, growing from the base of the pycnidium on short sporophores, measure 7 by 2·2 μ. Black, sclerotioid bodies, with a black surface and hyaline, rubbery context, are formed in the secondary necrotic area round the spots and appear to represent a phase in the life-cycle of the fungus. They produced a growth in culture indistinguishable from that arising from the pycnidiospores. The most susceptible varieties of the highbush swamp blueberry are Cabot, Dixi, Pioneer, and Rancocas, followed by Adams, Concord, Jersey, and Weymouth, while Grover, Harding, June, and Sam are fairly resistant.

Phyllostictina vaccinii n.sp. produces on the foliage of *V. ashei* in North Carolina and Maryland, *V. australe* in North Carolina, and *V. atrococcum* and *V. pallidum* × *V. atrococcum* in Georgia, russet to grey, purple-edged spots, mostly 1 to 3 mm. in diameter, and on fruits of the first-named (Black Giant variety) circular, grey, flat or sunken, hard lesions, 6 to 8 mm. across. Thick-walled, subcarbonaceous, oval to globose, subepidermal pycnidia, averaging 75 by 68 μ, are formed sparsely on the foliage (usually one to six per leaf), but on the fruits they are larger (188 by 165 μ), and more numerous. The hyaline pseudoparenchyma tissue filling the cavity is transformed by histolysis into ovoid to globose, hyaline, granular, non-septate pycnidiospores, 7·6 by 7 μ, with hyaline, delicate appendages up to 96 μ long. Conidiophores develop only after the discharge of conidia arising through histolysis.

Gloeocercospora inconspicua n.sp. is the agent of spotting, sometimes resulting in defoliation, on both leaf surfaces of *V. australe* in North Carolina, Georgia, and Maryland. The sooty to brown or greyish, circular to angular spots, 2 to 5 mm. in diameter, may easily be confused with those of *D. caroliniana* before the secondary spread of the latter. The subcuticular sporodochia, inconspicuous in a dry state, appear as gelatinous spherical to conical globules when wet, 45 to 96 by 60 to 85 μ. The filiform, hyaline, curved, septate conidia, 35 by 3 μ, are borne on hyaline, simple conidiophores.

A severe attack of the destructive mummy-berry disease attributed to *Sclerotinia vaccinii-corymbosi* [*R.A.M.*, iv, p. 610] occurred on *V. ashei* in Mississippi in 1940. Specimens of blighted shoots and blossoms and mummied berries were submitted to E. E. Honey, who referred the causal organism to the genus *Monilinia* [ibid., xv, p. 531]. The perfect state did not develop until the following year, when the pathogen was found to be identical with *S. vaccinii-corymbosi* (= *M. vaccinii-corymbosi*).

The following diseases are widespread and well known: powdery mildew (*Microsphaera alni* [var. *vaccinii*: ibid., xviii, p. 694]), leaf rust (*Pucciniastrum myrtilli*) [ibid., xxii, p. 489], witches' broom (*P. goeppertianum*) [ibid., ix, p. 602], and cane canker (*Physalospora corticis*) on *V. ashei* and *V. australe* [ibid., xxii, p. 214]. *Pucciniastrum myrtilli* is not confined to regions where its alternate host (*Tsuga* sp.) is indigenous, the heaviest infections on cultivated blueberry leaves having been observed by the writers in the Coastal Plain sections of North Carolina, Georgia, and Alabama, at least 200 miles distant from native hemlock growth. A high incidence of leaf rust in the south is exceptional, but in 1945 it was so severe at Boston, Georgia, on *V. ashei* that the early leaves were falling and new foliage developing before mid-June. In 1946 the disease was observed for the first time in a blueberry field on the eastern shore of Maryland. The sporadic outbreaks of *P. myrtilli* in regions remote from hemlock are explicable on the assumption of a regular over-winter survival of the uredosori on southern *V.* spp. with evergreen leaves, while some may also persist in deciduous blueberry plantings where some of the foliage remains green in mild winters. A further possibility is that such occasional epidemics may be initiated by spores conveyed in upper air currents from distant wild hemlocks.

Minor or rare pathogens of blueberry include twig blight (*Diaporthe vaccinii*) [ibid., xix, p. 550]; stem and crown gall (*Phomopsis* sp.) [ibid., xvii, p. 403]; a species of *Botrytis* attacking the blossoms, fruits, and succulent leaves during protracted foggy periods, especially in Oregon; *Exobasidium vaccinii* [ibid., xxiii, p. 346] causing hypertrophy and vivid red coloration of blossoms, fruits, and foliage, and the imperfect state (*Gloeosporium*) of *Glomerella cingulata*, collected by H. F. Bergman in 1939 in a Long Island (New York) blueberry planting where extensive defoliation was proceeding. The fungus was isolated by the writers and virulently attacked the young leaves, succulent shoots, and green berries of greenhouse plants of *V. australe* in inoculation experiments. The following were listed by Wilcox (*Plant Dis. Reptr*, xx, pp. 106–107) as occurring on blueberries: *Helminthosporium* [*Curvularia*] *inaequalis* [*R.A.M.*, xiii, p. 475], *Melanospora destruens* [ibid., xvi, p. 199], *Pestalozzia* [*Pestalotia*] *guepini* [var.] *vaccinii*, *Sphaeropsis malorum* Pk [*Physalospora obtusa*], *Dothiorella ribis*, and *Alternaria* sp.

An examination of type material of *Septoria difformis* Cke & Pk from *V. pennsylvanicum* (*Rep. N.Y. Mus. nat. Hist.*, 1878) pointed to the identity of the pathogen with *Ramularia vaccinii* Pk (loc. cit., 1884).

Marloth (R. H.). **The Mango in South Africa. III(b). Diseases and pests.**—*Fmg S. Afr.*, xxii, 256, pp. 615–619, 1947.

In this concluding section of a series of articles on the cultivation of the mango the author summarizes the results of the work carried out during the past two years by Dr. F. C. Loest on the diseases of mangoes and their control in South Africa [*R.A.M.*, xvii, p. 121; xxvi, p. 331]. A systemic 'brown rot' disease caused by *Physalospora perseae* [ibid., xxvi, p. 331] (probably previously attributed to anthracnose, *Gloeosporium mangiferae*), proceeds from the flowers and branchlets into the main inflorescence stalk which may develop the characteristic longitudinal black cracks. The rind of fruits which are nearly set may turn from yellowish-brown to brownish-black and become leathery in texture before the fruit finally drops. This drop may amount to 90 per cent. of the fertilized fruits and may

continue until the fruit is fully formed. Isolated attacks of the fungus on the trunks of young trees have caused severe gumming and necrosis.

The control measures for blossom and fruit diseases as advocated by Wager have been modified as follows. At least one dusting should be given at the height of the blossoming period with a 50:50 sulphur-copper mixture, the source of copper being copper oxychloride, Bordeaux powder, or any copper fungicide. When the fruit has grown almost to marble size the first spray, consisting of 6:6:100 Bordeaux plus a good spreader, should be given, followed by another when the fruit is half grown. The third should be applied, according to weather conditions, three weeks to a month later and the fourth some weeks before picking time when the fruit is fully developed. This is the time when black spot (*Bacterium mangiferae*) infection can reduce the market value of the fruit, especially if wet weather prevails. The number of later sprays may be varied but one or more blossom dustings are essential. Care should be taken that only clean and healthy fruit is packed for market.

Hodgson (R. W.). **Avocado tree decline.**—*Calif. Citrogr.*, xxxii, 11, p. 517, 1947.

In a two-year study of avocado decline in California [*R.A.M.*, xxvi, p. 68] *Phytophthora cinnamomi* was recovered from about 80 per cent. of the affected trees and from 20 per cent., apparently healthy, growing near. There is no relationship between rootstock and the occurrence of decline, as new avocado plantings on Mexican, Guatemalan, and West Indian rootstocks have failed consistently in decline areas. The author recommends that the planting of avocado trees on soils which have poor, very slow, or generally ineffective drainage or which have borne affected trees should be avoided. Decline may possibly be delayed or prevented by the installation of intercepting drains and by careful soil management practices. Other crops or tree fruits such as citrus should be planted on areas where avocado trees have declined.

Wilson (J. D.) & Sleesman (J. P.). **Some of the newer pesticides damage plants.**—*Bi-m. Bull. Ohio agric. Exp. Sta.*, xxxii, 245, pp. 58–63, 2 figs., 1947.

The effects of some insecticides and fungicides [*R.A.M.*, xxvi, p. 20] on cucumbers, potatoes, and tomatoes while growing in a greenhouse prior to planting out in the spring were studied. On cucumbers organic fungicides were less injurious than inorganic. Zinc ethylene bisdithiocarbamate and zerlate (both 1½ to 100) had no adverse effect on growth, copper oxychloride sulphate (COCS, 2–100), fermate (1½–100), and copper 8-quinolinolate (1–100) caused slight stunting and (in increasing order of severity), copper A (2–100), tribasic (2–100), Bordeaux (4–4–100), and dithane+zinc sulphate+lime (4–1–½–100) caused severe stunting.

Potatoes treated with zerlate (2–100), copper hydrate (3–100), and COCS (4–100) showed no effects, copper 8-quinolinolate turned the plants slightly yellow, dithane +zinc sulphate+lime caused some leaf necrosis, dithane D–14 (4–100) induced necrotic spots and death of many leaves (the addition of zinc sulphate and hydrated lime considerably reduced the injury), and Bordeaux (8–8–100) caused stunting and marginal leaf injury.

The effects on tomatoes were as follows: copper 8 quinolinolate and zerlate caused no injury; COCS, very slight; copper hydrate, slight stunting; Bordeaux and dithane+zinc sulphate+lime, some leaf deformation; dithane D–14 killed many leaves.

Fungicides tend to increase transpiration but there is a gradual return to the normal rates. The fungicide which caused definite leaf injury (puratized) also caused marked decrease in transpiration. These experiments show that the chemical injury to plants can offset, or even outweigh, the beneficial effects of

insect and disease control, and the author recommends the use of those materials that offer the best balance between disease control and plant damage.

Frear (D. E. H.). **Simple names for pest control chemicals.**—*Plant Dis. Reptr*, xxxi, 9, pp. 328–329, 1947. [Mimeographed.]

The author advocates the assignation of simple names to pest control chemicals to replace the cumbersome terms at present in use. He recommends the formation of a joint representative committee of plant pathologists and entomologists to choose 'trivial' names which can be coined for tested compounds in common use [*R.A.M.*, xxvi, p. 553].

Mason (C. L.) & Powell (D.). **A Pythium plate method of evaluating fungicides.**—*Phytopathology*, xxxvii, 7, pp. 527–528, 1947.

In the writers' supplementary method for the evaluation of fungicides, *Pythium debaryanum* is grown for five days on potato dextrose agar, a piece of which, ½ in. sq., is placed in the centre of a sterile Petri dish and seeded with about 50 sterilized wheat seeds. Sufficient moisture is maintained by the addition of 5 ml. sterile water. After four days at 24° C., when each seed is thoroughly infested, 20 ml. of the fungicidal solution is poured into a 10-cm. Petri dish and one seed is placed in the centre. Measurements of mycelial growth are made after 48 hours by means of a millimetre rule attached to the surface of a glass-topped box containing a 60-watt electric bulb. Plates containing 20 ml. distilled water and one infested seed are used as controls.

In comparative tests of 8-quinolinol and nine of its derivatives by the *Pythium* plate technique, McCallan's setting tower [*R.A.M.*, xx, p. 28], and the American Phytopathological Society's spore-dilution slide method [ibid., xxvi, p. 497] with *Stemphylium sarciniforme* as the test organism, the three procedures showed the same trend of toxicity. The *Pythium* plate method is simple, economical of time, and should prove useful in the selection of compounds as fungicides.

Christoff [Khristov] (A.). Чинково-сулфатен метод за получаване на колоидална сяра в земеделското стопанство. [Zinc sulphate method for home-made colloidal sulphur.]—*Annu. Univ. Sofia*, xxv, 1, 1946–7, pp. 207–212, 1947. [English summary.]

The following is a modification of the author's permanganate method of making colloidal sulphur [*R.A.M.*, xxv, p. 463]. A diluted zinc sulphate solution (75 to 100 gm. to 25 l. water) is poured slowly into 100 l. diluted lime-sulphur solution (0·5 (25° Baumé) to 100). The yellow polysulphides turn white at the end of the reaction. The sulphur content of the mixture is 1 to 1,000 and its P_H about 8. It can be mixed with calcium arsenate, resin soap, glue, nicotine, or agria (a Bulgarian nicotine insecticide).

Macdonald (J. A.). **Experiments with D.D.T.**—Reprinted from *Scot. J. Agric.*, xxvii, 1, 2 pp., 1947.

The results of experiments carried out at St. Andrews during 1946 showed that DDT, used either as a spray or as a dust, had no effect on club root of crucifers (*Plasmodiophora brassicae*) [*R.A.M.*, xxvi, p. 32] or late blight (*Phytophthora infestans*) [loc. cit.] of potatoes.

Jenkins (Anna E.). **Spot anthracnoses.**—*Yearb. Agric. U.S. Dep. Agric., 1943–1947*, pp. 451–454, 1947.

The information in this account of the records and distribution of spot anthracnoses (*Elsinoe* and *Sphaceloma* spp.) in North and South America and some Pacific islands has been noticed from another source [*R.A.M.*, xxvi, p. 408].

Raper (K. B.). **Penicillin.**—*Yearb. Agric. U.S. Dep. Agric., 1943–1947*, pp. 699–710, 1947.

A brief account is given of the research work on penicillin carried out at the Northern Regional Research Laboratory, Peoria, Illinois, with special reference to the use of lactose-maize steep liquor medium, the production of the mutation Q–176, which doubled the yield produced by strain X–1612, types of penicillin, and assay, recovery practices, chemistry, and production. The paper concludes with a short survey of the uses of penicillin for medical and veterinary purposes [*R.A.M.*, xxvi, p. 556].

Josserand (M.). **La notion d'habitat en sciences naturelles et plus particulièrement en mycologie.** [The idea of habitat in natural science and more especially in mycology.]—*Bull. Soc. Nat. Oyonnax*, i, 1, pp. 56–62, 1947.

This is a discussion on fungi in relation to their natural habitats, especially those forming mycorrhiza of trees [*R.A.M.*, xxvi, p. 505], and several sphagnaceous, carbonicolous, and fimicolous species. A description of the method by which fungi obtain their nourishment from the tree host is included.

Rozendaal (A.). **Ziekten van het stengelbont-type bij de Aardappel.** [Potato diseases of the stem-mottle type.]—*Tijdschr. PlZiekt.*, liii, 4, pp. 93–101, 2 pl., 1947. [English summary.]

A potato disease observed of recent years in Holland presents some remarkable features. It is confined to certain areas, mostly on light or peat soils, in which the etiological factor is believed to reside. The symptoms are suggestive of a virus disease, but in other respects the condition is quite dissimilar from the known viruses of potato. Complete transmission through the tuber is possible but exceptional, the percentage usually ranging from 50 to 100 per cent.

In contrast to plants suffering from the well-known virus diseases, those attacked by stem-mottle are often only partially infected, one stem alone showing the characteristic symptoms. The specks are much coarser and paler yellow than those of the common potato mosaics. The abnormally small, misshapen leaflets frequently bear yellow streaks and clear yellow spots; the latter are reminiscent of the potato aucuba mosaic virus but instead of its regular, round form they appear as stripes, arcs, rings or parts of rings, and so on. For this expression of stem-mottle the name of figure-aucuba mosaic is proposed. Necrotic spots, often disposed in arcs across the leaflets, may be present, e.g., on the Duke of York variety. Sometimes the petioles and stems are also involved, especially at the top of the plants, and more or less extensive dwarfing is prevalent, with damage to the growing point. The same variety is one of those exhibiting tuber necrosis, in the form of spots, stripes, or arcs, often accompanied by malformation; the symptoms resemble those of spraing [*R.A.M.*, xxvi, pp. 25, 76]. Severely diseased tubers often give rise to weak sprouts.

Most of the grafting experiments with tubers of diseased Bevelander and Duke of York gave negative results. In tests in which mildly diseased Duke of York stems were grafted on the same variety a few of the tubers showed typical necrotic spots but the offspring were healthy. However, a high percentage of transmission was secured by the insertion of more severely infected Duke of York stems on plants of the same variety, at least half the tubers developing characteristic necroses, which reappeared in some of the progeny. No evidence of insect transmission of the disease was forthcoming. The application of sap from mottled Bevelander plants to tobacco gave negative results in July, 1942 and 1943, but a repetition in the autumn of 1946 resulted in the development of typical local leaf necroses, sometimes leading to malformation.

Assuming the agent of stem-mottle to be a virus, as on the whole appears probable, the question arises of its possible relationship to a disease of like origin occurring in nature on tobacco, e.g., 'rattle' [ibid., xxv, p. 83], while a connexion with spraing is also not excluded. Growers believe that the risk of infection is increased by deep ploughing, while the use of dredgings as soil amendments is particularly inadvisable. Besides Duke of York and Bevelander, the Eigenheimer and Geelblom varieties are highly susceptible, and Beteka, Frühmölle, Magneto, Ultimus, Deva, Wilpo, Matador, Record, Koopman's Blauwe, and Ijselster susceptible to stem-mottle, while a very high degree of resistance, possibly amounting to immunity, characterizes Bintje, Noordeling, and Industrie, which are also highly resistant to spraing.

HARRIS (M. R.). **Accuracy of the ultraviolet light method in selecting Potato tubers free of virus.**—*Amer. Potato J.*, xxiv, 6, pp. 179–183, 1947.

In order to test the usefulness of ultra-violet light in detecting the presence of virus diseases in tubers grown in northern Maine, samples of nine potato varieties showing fluorescence were planted [*R.A.M.*, xxiv, p. 30]. There seemed to be no correlation between fluorescence of the tubers and the appearance of a virus disease in the plants growing from them, a large percentage of the fluorescing tubers producing apparently healthy plants. In further tests 22 varieties with distinct leaf-roll symptoms were examined by ultra-violet light. Several types of fluorescence were observed, over 50 per cent. of the tubers showing a light vascular fluorescence. Although there was no consistent correlation between fluorescence and the presence of leaf roll the author recommends that tubers showing light vascular fluorescence should be eliminated.

WILSON (R. D.). **Spotted wilt disease of Potatoes.**—*Agric. Gaz. N.S.W.*, lviii, 5, pp. 263–265, 3 figs., 1947.

During the past season potatoes in the Tableland area of New South Wales became widely affected by tomato spotted wilt [*R.A.M.*, xxiii, p. 75; xxv, p. 62], the outbreak resulting in the rejection for certification of many crops which were, in other respects, of a very high standard. Observations indicated that in culinary potatoes the disease is less serious in its economic consequences than it is in tomatoes and lettuces. Even where 30 to 50 per cent. of the potato plants are affected (and incidence was as high as this in some crops in the Orange-Millthorpe area) it is doubtful whether the reduction in tuber yield exceeds 10 to 15 per cent.

At present it is not known whether the outbreak indicates that the virus has become permanently established in weeds in this locality or merely that the exceptionally dry season was unusually favourable to the insect vectors [cf. ibid., xxii, p. 369]. It is hoped that the latter is the case, and that with a series of seasons of average rainfall, spotted wilt may once more become only a minor disease of rare occurrence in this area.

STEVENSON (F. J.) & AKELEY (R. V.). **Breeding healthy Potatoes.**—*Yearb. Agric. U.S. Dep. Agric., 1943–1947*, pp. 327–332, 1 pl., 1947.

In this account of potato-breeding work in the United States the authors state that the varieties Sebago [*R.A.M.*, xxvi, p. 379], Empire, Placid, Virgil, Chenango and Ashworth are resistant to late blight [*Phytophthora infestans*: cf. ibid., xxv, p. 313; xxvi, p. 77], Katahdin [ibid., xxvi, p. 147], Chippewa, Warba, Houma, Earlaine, Sebago, Red Warba, Mohawk, and Menominee to one or more virus diseases, and Menominee, Ontario, Cayuga, and Seneca to common scab [*Actinomyces scabies*: ibid., xxvi, pp. 166, 381].

Thung (T. H.). **Potato diseases and hybridization.**—*Phytopathology*, xxxvii, 6, pp. 373–381, 1947.

The two most important potato diseases in Java are late blight (*Phytophthora infestans*) and wilt (*Bacterium* [*Xanthomonas*] *solanacearum*), of which the latter has long been present in the country [*R.A.M.*, iv, p. 187], while the first severe outbreak of the former was recorded in 1936 [ibid., xvii, p. 60]. Resistance to wilt is the primary aim of breeding experiments in Java, since the causal organism, unlike that of late blight, cannot be combated by practical methods. In Java blight rarely invades the tubers and certain varieties have a different reaction to the disease from that shown in Europe. Testing for blight resistance is carried out in a field where the high atmospheric humidity is conducive to virulent infection over the greater part of the year. The varieties to be tested are planted in rows alternating with Bevelander and inspections are made 20, 30, 45, and 60 days after planting, when disease ratings ranging from 0 to 6, indicating the relative severity of infection, are assigned. The average of these ratings, those allotted at 30 and 45 days being doubled owing to their importance, is compared with that of Bevelander. A number of varieties and selections proved more resistant than Bevelander to *P. infestans*, including Arran Commander, Arran Chief, Arran Consul, Duke of Kent, Doon Star, Eigenheimer, Sutton Flourball, Thorbecke, Furore, Gladstone, Hellena, Industrie, Mathilde, N. Zeeland, Noordeling, Nationaal, Populair, Parnassia, Record, six hybrid progeny of back-crosses of *Solanum demissum*×*S. tuberosum* from the U.S.S.R., about a score of newly imported, not yet identified varieties, and five Californian progeny of *S. tuberosum*×*S. tuberosum*. Tests were also conducted in the field over a period of five years on the reaction to late blight of the wild species *S. andigenum*, *S. antipoviczii*, *S. caldasii*, and *S. demissum* [ibid., xiii, p. 652; xv, p. 600] and the F_1 offspring of crosses between them and *S. tuberosum*. *S. antipoviczii* and *S. demissum* were both completely resistant. *S. andigenum* showed 80 per cent. resistance, and *S. caldasii* 90 per cent. The hybrids between the cultivated potato and *S. andigenum*, *S. antipoviczii*, *S. caldasii*, and *S. demissum* showed 29, 33, 39, and 33 per cent. resistance, respectively.

Resistance to *X. solanacearum* is tested at another locality on heavily infested soil, where 20 tubers of each variety are planted in rows in random alternation with those of the standard Bevelander. Market varieties are assessed chiefly on the basis of tuber yield as related to storage rot, while longevity of the plants was the criterion for the wild varieties and hybrids. A variety of which more than half the plants remain healthy for a minimum period of two months is judged to be resistant, since 80 to 100 per cent. of Bevelander has usually contracted wilt within this time. The test is repeated at least twice to allow for variations in the incidence of infection. Many more diseased plants are commonly found during the rainy seasons than in the dry monsoon, and the average number over a whole year indicates the grade of resistance. Spraying with Bordeaux mixture was practised regularly.

The standard varieties of *S. tuberosum* and the Californian hybrids usually showed more than 50 per cent. wilt, often 80 to 100 per cent., and are regarded as susceptible. The wild species, *S. andigenum*, *S. antipoviczii*, *S. caldasii*, *S. chacoense*, and *S. demissum* showed 80, 80, 70, 70, and 40 per cent. resistance, respectively, to *X. solanacearum*. The hybrids from crosses between the five species (in the order given) and *S. tuberosum* were 31, 24, 33, 36, and 18 per cent. resistant, respectively, the corresponding figures for the same hybrids back-crossed to *S. tuberosum* being 58, 57, 54, 50, and 53 per cent., respectively, and the figures for the reciprocal back-crosses of the last three-named 53, 43, and 54 per cent., respectively.

The diminished resistance of the F_1 progeny in comparison with wild parent was to be expected, on the basis of results obtained elsewhere, as regards late blight,

but it was not known in connexion with *X. solanacearum*. The increased resistance to wilt among the back-cross progenies over the F_1 can probably be attributed to genetic factors, as external conditions were favourable for the disease, and it is hoped to confirm these promising results by further trials during the next few years. Several of the resistant populations, notably *S. tuberosum* × (wild species × *S. tuberosum*) combine attractive commercial characteristics with wilt resistance.

Peterson (L. C.). **The overwintering of Phytophthora infestans (Mont.) de Bary under Long Island conditions.**—*Amer. Potato J.*, xxiv, 6, pp. 188–197, 1947.

The South Fork area of Long Island, where potatoes are cultivated intensively and late blight occurs annually, is especially suited for the experiments on the overwintering of *Phytophthora infestans* [*R.A.M.*, xxv, p. 313]. Inoculated Green Mountain tubers were halved so that each half contained a lesion of approximately the same size and location. Ninety seed pieces were planted in soil in which potatoes had not previously been grown. Fifty failed to grow, 31 produced apparently healthy plants, and nine gave rise to diseased aerial shoots over a period of several weeks. In all cases stem infection could be traced back to the tubers. Such infected aerial shoots were observed occasionally under field conditions on Long Island. Late blight was also observed spreading from infected plants on cull piles to adjacent fields in June.

Experiments confirmed previous findings [ibid., xix, p. 490] that the formation in the soil of sporangia or zoospores which might initiate primary infections is of no importance on the South Fork of Long Island.

A number of unrelated plants and several types of soil were tested as potential media for the growth of *P. infestans*. Muck was the only soil on which the fungus made any appreciable growth. On soil samples from Long Island fields on which potatoes have been grown for many years, even the original piece of inoculum failed to sporulate, probably owing to the relatively high copper content of these soils. Leaves of a number of wild and cultivated solanaceous plants were inoculated with *P. infestans*: only *Petunia hybrida*, *Physalis angulata*, *Salpiglossis* sp., *Solanum dulcamara*, and *S. nigrum* allowed sporulation and of these only *S. dulcamara* is a perennial [cf. ibid., vi, p. 48]. It showed, however, a degree of resistance in that infected leaves turned yellow and soon fell. It has never been found infected in its natural habitat. It is concluded that none of the perennial members of the Solanaceae found growing wild on Long Island function as overwintering agents for *P. infestans*.

Bondartzev (A. S.) & Bondartzeva-Monteverde (Mme V. N.). О черной парше—**Rhizoctonia solani Kühn** на Картофеле в связи с современными методами его разведения. [Concerning black scurf and stem canker—*Rhizoctonia solani* Kühn—in relation to contemporary methods of Potato cultivation.]—*Volume of Scientific Works, Leningrad, 1941–1943, U.S.S.R. Acad. Sci.*, pp. 383–392, 6 figs., 1946.

In 1943, during examinations of potato sprouts on State farms in the neighbourhood of Leningrad in connexion with a new cultivation method in which minimum numbers of potato tubers are used, many were found to be infected with black scurf and stem canker (*Rhizoctonia* [*Corticium*] *solani*) [*R.A.M.*, xviii, p. 611 and next abstract]. The greatest damage was observed during the sprouting period. Plants raised from tubers in glasshouses and hot-beds suffered 10 to 15 per cent. loss and main crops from 45 to 68 per cent. Late plantings suffered 23 per cent. infection and early plantings up to 46 per cent., 10 to 31 per cent. showing severe infection. The variety Berlichingen was heavily attacked (36 per cent.). The authors stress the importance of further intensive investigations of this disease in U.S.S.R.

Bondartzeva-Monteverde (Mme V. N.). Некоторые экспериментальные данные о влиянии **Rhizoctonia solani Kühn** на урожай Картофеля. [Some experiments on the influence of *Rhizoctonia solani* Kühn on the Potato crop.]—*Volume of Scientific Works, Leningrad, 1941–1943, U.S.S.R. Acad. Sci.*, pp. 393–395, 1946.

In the experiments described in this study, conducted in the Leningrad district, potato tubers and cuttings infected with *Corticium solani* [*R.A.M.*, xxvi, pp. 27, 77] were planted in light, sandy, slightly alkaline soil (after clover), fertilized with ash and superphosphate. The effect of *C. solani* on each sprout was examined after 24 to 25 days. The crop was harvested between 15th and 18th September. From the results it is concluded that sclerotia of *C. solani* on infected tubers are responsible for the destruction of potato sprouts. The degree of infection depends on the temperature and humidity of the soil, its composition, and the potato variety. The date of planting influences the degree and severity of infection, early plantings showing a higher percentage of the disease. Very shallow planting of the tubers decreased the number of infected plants, but light, dry soil gave low yields. Heavy, moist soil is recommended. The basidial state of the fungus was observed on isolated plants. Sclerotia were found only on seven plants.

Bald (J. G.). **The treatment of cut Potato setts with zinc oxide. 1. Condition of the setts, growth, and yield.**—*J. Coun. sci. industr. Res. Aust.*, xx, 1, pp. 87–104, 1 fig., 2 graphs, 1947.

Data obtained from a preliminary field trial carried out at Canberra to test the effect of zinc oxide in reducing non-development of cut Up-to-Date potato tubers, infection by *Rhizoctonia* [*Corticium solani*] (with which missing is sometimes associated), and, possibly, common scab (*Actinomyces scabies*) [*R.A.M.*, xxiv, p. 114], are described and analysed. The tubers carried medium to heavy *C. solani* infection and scab lesions. The results showed that zinc oxide treatment reduced premature rotting of the cut setts and favoured suberization [ibid., xxiii, p. 498]. Parallel mercury treatments injured the cut surfaces and permitted entry to rotting organisms. Misses did not exceed 6 per cent.

The most effective treatment (dipping the cut setts in zinc oxide suspension, 5 oz. to 1 gal. water, the day before planting) did not reduce emergence, but the other zinc treatments somewhat retarded it; leaf area was little affected.

Zinc oxide had slight effects on total yield, while mercury treatments depressed it. Careful analysis suggested that the zinc absorbed through the sett increased the ratio of tubers to foliage, possibly because the soil was slightly deficient in zinc. Treatments that tended to induce premature rotting of the setts depressed total yield. Efficiently applied, zinc oxide dip increased the over-all growth of the plants by protecting the setts from rotting.

The effects of the treatments on the incidence of *C. solani* and scab are reserved for a second paper.

Bonde (R.), Stevenson (F. J.), & Akeley (R. V.). **Breeding Potatoes for resistance to ring rot.**—*Phytopathology*, xxxvii, 8, pp. 539–555, 1947.

Following preliminary investigations at the Maine Agricultural Experimental Station as to the practicability of breeding potatoes for resistance to ring rot (*Corynebacterium sepedonicum*) [*R.A.M.*, xxii, p. 37], further studies along the same lines were carried out from 1942 to 1945 inclusive. During this period the resistant variety President and five resistant seedling selections, viz., 47102 (Teton) [ibid., xxvi, p. 166], 46952 (Earlaine × 43055), 055 (Chippewa × Katahdin), 870 (Earlaine × 366–144), and 824 (Houma × 366–144), contracted very little disease despite artificial inoculations far exceeding in severity any degree of contamination likely to be encountered in nature. Green Mountain and Houma proved highly

susceptible, Katahdin somewhat less so, while Sebago gave some indication of resistance. Of 49 progenies derived from crosses between resistant and susceptible parents, the percentage of resistant seedlings in the 13 with both parents resistant ranged from 53 to 89·9 and averaged 68·9; in the 28 with one parent resistant the range was from 11·1 to 76·9 and the average 42·7; and in the eight with both parents susceptible the corresponding figures were 0 to 50 and 8·8, respectively.

President and the related selections, e.g., 336–18 and 336–144, produced high percentages of ring-rot resistant seedlings when used in the breeding programme, but their late maturity and unattractive shape preclude their use as commercial varieties. On the other hand, the resistant seedlings 46952 and 47102 produce highly resistant offspring of desirable marketing quality.

The method used in these experiments for testing seedling reaction to ring rot was found to be reasonably accurate, most of the surviving plants possessing a high degree of resistance and the number of 'escapes' being very low. For instance, of 347 seedlings selected as resistant in 1944 and reinoculated in 1945, 286 (82·42 per cent.) maintained their freedom from infection in the latter year.

Resistance of the tubers (as distinct from the whole plant) was shown by experiments to be transmissible to the progeny of crosses between resistant parents.

Crosses between the ring-rot resistant seedlings 46952 and 47102 and selections from U.S.D.A. crosses 76, 96, and 918, resistant to late blight [*Phytophthora infestans*], produced a high proportion of descendants with resistance to both diseases. It is concluded that the valuable parent material now available should facilitate the development of new varieties combining suitability for commercial purposes with resistance to ring rot and other diseases. The seedling 47102 has been named Teton and has been distributed to a number of growers.

Knorr (L. C.). **Field testing of disinfectants for the control of Potato ring rot bacteria on wooden and metallic surfaces.**—*Amer. Potato J.*, xxiv, 5, pp. 141–150, 1947.

In the field tests described in this article slats of potato crates were inoculated with potato ring rot (*Corynebacterium sepedonicum*) [*R.A.M.*, xxiv, p. 116; xxvi, p. 353] ooze and disinfected in various chemicals. Cut surfaces of healthy tubers were then rubbed over the slats and planted, wilted vines or affected tubers giving evidence of ring rot survival.

The following disinfectants on wooden surfaces gave complete control: copper sulphate, mercuric chloride, coal tar phenols, alkyl dimethyl benzyl ammonium chlorides, and an ammoniacal solution of copper-zinc-phenol.

Tests of compounds for the disinfection of metal screws were carried out by treating infested screws and thrusting them into the vascular region of healthy tubers before planting. Compounds which gave complete disinfection were copper sulphate, formalin, alkyl dimethyl benzyl ammonium chlorides, N (higher acyl esters of colamino formyl methyl) pyridinium chloride, di-isobutyl cresoxy ethoxy ethyl dimethyl benzyl ammonium chloride, and lauryl isoquinolinium bromide.

Copper sulphate is recommended as the cheapest and most easily obtainable of the disinfectants, applicable to both wooden (1 lb. to 10 gals. water) and metallic (2–10) surfaces.

Starr (G. H.). **The effect of different concentrations of bacterial suspensions used in inoculations upon subsequent ring rot symptoms in the Potato plant.**—*Amer. Potato J.*, xxiv, 5, pp. 151–156, 1947.

Potato seed pieces eye-inoculated by stabbing and those soaked for 60 minutes in a bacterial suspension developed about the same percentage of ring rot (*Corynebacterium sepedonicum*) [see preceding and next abstracts]; a lower percentage resulted from soaking the seed pieces for shorter periods.

In 1945 the dilution (1 to 16) of the bacterial suspension caused only a slight reduction in the plant symptoms resulting after eye inoculation. But when the seed pieces were soaked in the suspension for ½ minute, ring rot in the plants was considerably less and there were relatively fewer bacteria. In 1946, a 1:1,000 bacterial suspension produced only a small amount of ring rot. In all tests eye inoculation induced earlier ring-rot symptoms than immersion, the difference becoming less with the advancing season. No ring spot was detected in the plants grown from seed pieces inoculated with 1 to 100 and 1 to 1,000 suspensions and planted one week later than the others.

Starr (G. H.). **The longevity of Corynebacterium sepedonicum on Potato bags when placed under different environmental conditions.**—*Amer. Potato J.*, xxiv, 6, pp. 177–179, 1947.

Tests were conducted during 1942, 1943, and 1946 at the Wyoming Agricultural Experiment Station to study the persistence of the ring rot bacteria (*Corynebacterium sepedonicum*) [see preceding abstracts] on potato bags under various environmental conditions. The results showed that ring rot bacteria may remain in a viable condition on rolled-up burlap bags stored either inside or outside potato-storage cellars from November to June. Some of the tests, however, showed negative results for this period.

Contaminated burlap bags hung singly fully exposed to the sun showed a marked reduction in infectivity but not a complete elimination of the bacteria after 40 days, while on those placed indoors away from the sun, the number of viable bacteria was hardly reduced.

Wilson (J. D.). **Relation between spray treatments and frost damage to Potatoes and Tomatoes.**—*Bi-m. Bull. Ohio agric. Exp. Sta.*, xxxii, 245, pp. 77–82, 1 fig., 1947.

On 2nd October, 1946, a minimum temperature of 33° F. resulted in varying degrees of injury to potatoes and tomatoes growing in experimental plots at Wooster. All plants sprayed with copper-containing materials during the summer were more severely damaged than those sprayed with other fungicides. A similar effect was reported from Marietta where tomatoes, treated with copper compounds in the seed-bed, were killed in the field by a light frost, whereas plants which had received no copper were unaffected. At Wooster 85 to 96 per cent. of the potato leaves previously treated with Bordeaux, COCS, copper hydrate, copper A, cuprocide, tribasic, and tribasic+dresinate were killed by the frost, and 49 to 55 per cent. of those previously sprayed with copper 8-hydroxyquinoline, dithane Z78, zinc ethylene bisdithiocarbamate, zerlate, and with alternating treatments of the two last named. The zinc-treated plants were in a somewhat better foliar condition than those treated with copper compounds, which may explain their greater resistance to frost damage. The plants sprayed with Bordeaux mixture were most severely injured.

Tomatoes previously treated with copper-containing materials also showed much greater frost injury than those sprayed with zinc-containing organics (carbamates); those treated with fermate were severely damaged. Adhesives (bentonite and omilite) with COCS seemed to increase frost injury, possibly because the foliage carried a heavier load of copper. Plants sprayed alternately with tribasic and zerlate showed less damage than those treated with copper alone.

Wright (N. S.). **A Stemphylium leaf spot on Potatoes in British Columbia.**—*Sci. Agric.*, xxvii, 3, pp. 130–135, 3 figs., 1947.

An examination of leaf lesions during a study of potato early blight (*Alternaria*

solani) showed that some were lighter brown than those of typical early blight and lacked the characteristic concentric zonation. Sporulating atypical lesions yielded a species of *Stemphylium* identified as *S. consortiale* [*R.A.M.*, xxiv, p. 42], although frequently *A. solani* was also present. It is possible that, in British Columbia at least, the *Stemphylium* leaf spot has been included in the general conception of early blight. Both diseases occur towards the end of the growing season under humid conditions and leaf samples collected in different sections of the province seem to indicate that the *Stemphylium* leaf spot has about the same distribution as early blight. More evidence about the natural occurrence of *S. consortiale* infection must be obtained before an estimate of its economic importance can be made. The pathogen probably overwinters on decaying organic matter in the vicinity of potato fields. It is possible that, favoured by conditions of extreme humidity and high temperatures, an epidemic might occur.

To induce sporulation the *Stemphylium* lesions, after surface-sterilization, were floated on waxed filter papers on sterile water in Petri dishes. After three to five days single spores could be isolated with a moistened glass micro-needle.

The morphological characters of the mycelium, conidiophores, and conidia agree with those described by Groves and Skolko [loc. cit.]. The optimum temperature for growth was 28° to 30° C. and the maximum was slightly below 40°. Aerial mycelium was sparse and conidial production plentiful within the pH range 4·2 to 6·1. Growth was most vigorous at pH 6·95 but that between 8·5 and 9·75 was typical of the normal development of the fungus.

An aseptic spore suspension was made in a solution consisting of 1 part glycerine to 4 parts water to obviate drying and this was atomized on to the leaves and stems so that the plant parts were thoroughly wetted. Numerous lesions appeared on all parts of the tomato shoots 72 hours after the inoculation and, except for a few new leaves at the top of the plant, complete defoliation occurred within 8 to 12 days. The first symptoms on the potato appeared three days after inoculation, the lesions being confined to the laminae. After five to eight days general yellowing of the lower leaves took place and a coalescence of many of the lesions which varied from 1 to 10 mm. in diameter. Within two weeks almost complete defoliation had occurred. Leaf lesions also appeared on inoculated leaves of tobacco, *Nicotiana alata*, *Solanum nigrum*, and *Datura stramonium*. The fungus was reisolated successfully from tomato plants var. John Baer and Katahdin potato plants.

After inoculation, the fungus spores germinate on the moist leaf surface and the hyphae penetrate the epidermis (probably through stomata or through cell walls after these have been weakened by some substance supplied by the fungus). The mycelium then grows intercellularly and after three days dead infected cells can be observed.

Berger (K. C.) & Gerloff (G. C.). **Stem streak necrosis of Potatoes in relation to soil acidity.**—*Amer. Potato J.*, xxiv, 5, pp. 156–162, 2 figs., 1947.

During the course of a greenhouse fertilizer and lime experiment, at the Wisconsin Agricultural Experiment Station, with potatoes in Antigo loam (pH 4·7), a severe stem streak necrosis developed where the soil had been treated with sulphates and chlorides, but not where it had been limed. This necrosis was found frequently in the field where the soils were more acid than pH 5·1.

Greenhouse tests in complete nutrient solution showed that the disorder was not due to pH, soluble aluminium, or deficiency of calcium or magnesium, but when the solution contained 100 or 200 p.p.m. soluble manganese a similar stem streak necrosis developed. It was concluded, therefore, that excess soluble manganese is the cause of stem streak necrosis of potatoes in acid soils.

Lasser (T.) & Rodríguez Landaeta (A.). **Dothidella ulei en Venezuela.** [*Dothidella ulei* in Venezuela.]—*Bol. Soc. venez. Cien. nat.*, x, 64, pp. 117–119, 1944. [Received November, 1947.]

In connexion with the discovery of South American leaf blight (*Dothidella ulei* or *Melanopsammopsis ulei*) of *Hevea* rubber [*R.A.M.*, xxvi, p. 481] in Caripito, Venezuela, in February, 1942, the writers briefly describe the symptoms of the disease, the life-history of the pathogen, its mode of dissemination, and the environmental factors concerned in its development.

Stief (J. L.) & Boyle (J. J.). **Effect of fungicides on natural and synthetic Rubber.**—*Industr. Engng Chem.*, xxxix, 9, pp. 1136–1138, 4 graphs, 1947.

Military operations in tropical regions necessitate the protection from fungal attack of cotton cloth used in fabrics coated with synthetic rubber [*R.A.M.*, xxv, p. 466]. In this paper the writers describe the results of soil burial tests at Fort Belvoir, Virginia, to determine the effects of some standard fungicides on the physical properties of natural and synthetic rubbers. Natural rubber, GR–S, and neoprene exhibited no appreciable loss of strength due to fungal infection, so that the application of a fungicide to the vulcanizate itself was not considered necessary. Pyridyl mercuric stearate, salicylanilide, pentachlorophenol, and 2,2'-methylene bis (4-chlorophenol) were virtually innocuous when incorporated directly into these three types of rubber before curing. Copper naphthenate, however, slightly weakened neoprene, caused more extensive deterioration of natural rubber (especially after ageing), and was responsible for marked loss of strength in GR-S.

Waksman (S. A.). **Soil organisms and disease.**—*Yearb. Agric. U.S. Dep. Agric., 1943–1947*, pp. 511–517, 1947.

In this paper the author reviews and discusses very briefly different theories that have been put forward to explain the rapid disappearance from the soil of disease-producing bacteria and other micro-organisms. He shows how the concept of the presence of antibiotics in the soil became evolved, and concludes with a succinct account of the importance in this connexion of tyrothricin, penicillin, and streptomycin [*R.A.M.*, xxvi, p. 73].

Lochhead (A. G.) & Thexton (R. H.). **Qualitative studies of soil micro-organisms. VII. The 'rhizosphere effect' in relation to the amino acid nutrition of bacteria.**—*Canad. J. Res.*, Sect. C, xxv, 1, pp. 20–26, 1947.

Studies on the relative incidence of bacteria having different nutritional requirements in the soil have shown that one of the most characteristic rhizosphere effects [*R.A.M.*, xix, p. 421] is the preferential stimulation of bacteria which require amino acids for maximum growth. The rhizosphere soil of mangolds [ibid., xxvi, p. 156] contained more organisms for which amino acids were either stimulative or essential than did the surrounding soil. There was no similar effect, however, regarding bacteria responding to growth factors. Although this effect may be ascribed to the excretion of amino acids by growing plants, it may also be related to associative and antibiotic effects exerted by other bacteria, stimulated in the rhizosphere, and with different degrees of compatibility towards those responding, respectively, to amino acids and growth factors. In any case, the study of nutritive differences among micro-organisms in the rhizosphere may be useful for securing a better knowledge of the physiological activity of the plant root system and of factors important in crop rotation and the control of soil-borne diseases of crops.

Nickell (L. G.) & Burkholder (P. R.). **Inhibition of Azotobacter by soil Actinomycetes.**—*J. Amer. Soc. Agron.*, xxxix, 9, pp. 771–779, 1 fig., 1 graph, 1947.

The inhibition of *Azotobacter vinelandii* by 25 cultures of Actinomycetes isolated

from soil samples (23 from different regions of the United States, one from Canada, and one from New Guinea) was demonstrated with nutrient agar streak plates and shaken culture broths in filter paper agar plate tests. The nitrogen-fixing bacteria were either greatly reduced in number or completely destroyed by a particularly potent Actinomycete culture from Texas during joint incubation in various mixtures of soil and fertilizers and crop residues. The data emphasize the importance of microbial antagonism as a factor both in theoretical ecology and practical agriculture.

Drosdoff (M.). **The use of minor elements.**—*Yearb. Agric. U.S. Dep. Agric., 1943–1947*, pp. 577–582, 1947.

After briefly discussing the importance of minor elements to plant growth, methods of diagnosing their deficiency, and the problem of their application, the author summarizes the chief pertinent facts from the agricultural point of view concerning the role of boron, magnesium, copper, zinc, manganese, iron, and sulphur in plant nutrition.

Proceedings of the Association of Applied Biologists.—*Ann. appl. Biol.*, xxxiv, 1, pp. 144–165, 1947.

At a meeting of the Association of Applied Biologists on 4th October, 1946, Sir Edward Salisbury opened, with a general introduction, a symposium on the significance of trace elements in plants and animals. He indicated briefly some aspects which future research might well explore.

T. Wallace, in a paper on visual diagnosis of mineral deficiencies of plants [*R.A.M.*, xxvi, p. 353], describes the basis of the method, its special uses, and use in the field. In conclusion the author points out that skill in using this method can only be acquired by intensive study and experience.

D. J. D. Nicholas gives a definition and review of work already done by various authors on chemical tissue tests. He describes in detail the technique to be employed under the headings of field sampling methods, preparation of test samples, and extraction of easily soluble nutrients. A brief review is given of the chemical tests used together with information on nutrient standards, diagnostic value, and limitations of tissue tests; the correlation with other diagnostic methods, viz., visual diagnosis, full chemical analysis of the leaves, and soil data, is discussed.

W. A. Roach described the three methods, leaf analysis, plant injection, and curative treatment for the determination of mineral deficiency in plants, and the practical application of these methods to various crops. The importance of measuring the effect of curative treatment on yield and quality in field experiments is specially emphasized.

Wilkinson (E. H.). **Progress report on Hop disease. Investigations in the west Midlands.**—*Rep. agric. hort. Res. Sta. Bristol, 1946*, pp. 100–104, [? 1947].

This report deals with the hop diseases in the west Midlands and includes the results of experiments (still in progress) in this area and at Long Ashton.

Mosaic [*R.A.M.*, xxiv, p. 288] has become so destructive in the Golding districts that many growers have replaced this variety with the tolerant Fuggles hop. Hot water treatment of infected cuttings failed to inactivate the virus. The control measures recommended are the use of cuttings and roots from disease-free stocks; the separation of Golding yards as far as possible from tolerant varieties; the planting of sensitive males only; and frequent and thorough inspection of the hop-yards with destruction of the mosaic plants detected.

The spread of nettlehead [ibid., xxvi, p. 419 and next abstract] during the last four years causes concern to many growers. The virus attacks all varieties, including male hops, and occurs mainly in the vicinity of yard margins, in close

proximity to hedgerows and trees. It is suggested that certain hedgerow plants might be the symptomless virus carriers.

Split leaf blotch [ibid., xxii, p. 38], a more serious form of split leaf, is present in all Fuggles yards, causing up to 75 per cent. infection. In severe cases all leaves are split and distorted, the hop-bearing laterals are short, and growth and crops are considerably reduced. The first symptoms appear during the first week of June, the subapical leaves down to those at the 3- to 4-ft. level becoming oily-transparent except for an outer green band involving the leaf serrations. After a few days the typical oily patches develop, mostly in the centre of the leaf, sometimes between the lobes. Later the patches dry and turn brown, causing marked puckering and distortion of the leaves. On infected leaf margins one lobe usually turns over, forming a 'parrot beak'. Healthy bines are mostly 2½ ft. higher than the diseased ones. Plants showing infection in August were mostly those which had spidery growth in the previous spring, while those with a healthy, bushy appearance in April remained healthy. Of 100 infected Fuggles cuttings planted with the same number of healthy ones, only 66 per cent. of the former rooted compared with 100 of the latter; all the surviving infected cuttings developed typical split leaf blotch. When cuttings from severely infected Fuggle plants were grafted to 22 healthy plants of the same variety in May to June, 1944, 12 of these showed symptoms; in June, 1945, eight were healthy and two had died. Three of the control plants showed symptoms and 18 were healthy.

Two new cases of the chlorotic hop disease [ibid., xxii, p. 38; xxiii, p. 438] were reported in 1945 and four more in 1946. The results of three years' observations suggest that the spread of the disease in the field is very slow.

Only one instance of small hop disease [ibid., xix, p. 364] has been observed in the west Midlands on a single stock of the Mathon variety.

Tolhurst (J. A. H.). **Soil conditions in relation to nettlehead of Hops in the west Midlands. Progress report, 1946.**—*Rep. Agric. hort. Res. Sta. Bristol, 1946*, pp. 105–112 [? 1947].

In order to determine the relation between hop nettlehead [see preceding abstract] and soil type and the nutritional status of the plant, a survey was made of ten Fuggles hop yards on Old Red Sandstone near Hereford. Localized nettlehead outbreaks may be correlated with soil type 1 (medium loam containing mica over red marl (below 27 in.), 1a (similar to 1 with sandier surface and deeper layers), and 4a (shallow Bromyard type, with red marl at less than 18 in.). Tissue tests revealed no correlation between the incidence of nettlehead and the proportion of major elements in the hop and none between soil types and the nutritional status of the plant.

Uppal (B. N.), Kamat (M. N.), & Patel (M. K.). **Powdery mildew of Betel Vines.**—*Proc. Indian Acad. Sci.*, Sect. B, xxiv, 6, pp. 255–259, 1 fig., 1946.

Oidium piperis n.sp. is the name assigned to the fungus responsible for a powdery mildew causing severe damage to betel vines [*Piper betle*] near Bombay [*R.A.M.*, xviii, p. 437]. Its superficial mycelium consists of branched, hyaline, septate hyphae, 5 to 8·2 μ in diameter, forming an efflorescence of varying thickness on the lower leaf surfaces; the slender tubes arising from the under surface of the hyphae pierce the cuticle and penetrate into the interior of the epidermal cells, where they swell into globular haustoria. The erect, simple, mostly bi- to triseptate conidiophores are 66 to 132 μ long and produce from their apices chains of 3 to 10 unicellular, hyaline, elliptical or barrel-shaped conidia, 20·4 to 74·7 by 6·8 to 23·8, mostly 34 to 47·5 by 13·7 to 20·4 μ, germinating by means of a tube.

The disease may be effectively combated by dusting with finely powdered sulphur [loc. cit.], a single application of 25 to 30 lb. per acre in mid-December sufficing

in newly planted gardens (three to six months old), while those of one to two years require a second treatment about three weeks later, using a total amount of dust for both operations of 70 to 85 lb.

Slooff (W. C.), Thung (T. H.), & Reitsma (J.). **Leaf diseases of Sereh (Andropogon nardus L.). II. Leaf blotch caused by Curvularia andropogonis (Zimmermann) Boedijn nov. comb.**—*Chron. Natur.*, ciii, 7, pp. 137–139, 2 figs., 1 diag., 1947.

Curvularia andropogonis (syn. *Napicladium andropogonis*) [*R.A.M.*, xiii, p. 475] was determined as the agent of a sereh (*Andropogon* [*Cymbopogon*] *nardus*) leaf blotch of some economic importance, especially during the rainy season, in the Buitenzorg district of Java [cf. ibid., xxvi, p. 355]. The elongated lesions, usually exceeding 20 by 0·5 cm., have greyish, necrotic centres and violet-reddish margins, and are situated mostly at the apex of the leaves. In severe cases each leaf may bear several long blotches, but the primary vein remains consistently free from infection. The growth of diseased plants is retarded and their yield reduced.

The triseptate, dark brown conidia of *C. andropogonis*, borne terminally and laterally on conidiophores 100 to 190 μ in length, measure 36 to 60 by 14 to 25 μ on the host and 36 to 41 by 16 to 21 μ on maize meal agar. The pathogenicity of the fungus was demonstrated by inoculation tests.

In a trial planting of 16 varieties five selections of Tjiogreg showed a considerable degree of resistance to the leaf blotch, and their productivity was not impaired by another disease of minor importance, probably due to a *Cylindrosporium*. The utility or otherwise of these lines for commercial planting must be decided by the market demands for geraniol and citronellol.

Kreibohm de la Vega (G. A.). **Medidas de precaución contra la enfermedad de la Caña llamada 'pokkah boeng' o 'mal de la escalera'. Informe preliminar.** [Precautionary measures against the Cane disease called 'pokkah boeng' or 'top rot'. Preliminary note.]—*Circ. Estac. exp. agric. Tucumán* 140, 72 pp., 3 figs., 1947.

In connexion with the recent discovery in Tucumán, Argentina, of the sugar-cane disease known in Java as 'pokkah boeng' or top rot (*Fusarium moniliforme*) [*Gibberella fujikuroi*: *R.A.M.*, xiv, p. 58 *et passim*], the symptoms are described from Bell's 'Key for the field identification of sugar-cane diseases' [ibid., viii, p. 463].

The percentages of infection in eight Tucumán selections (descendants of P.O.J. 2878) were as follows: 3342, 40·6; 3349, 29; 4268, 7; 3817, 3·6; 4363, 1·7; 4398, 6·2; 4410, 2·9; and 5028, 1. The more severely attacked should be excluded from further cultivation and the sites on which they were grown cleared by fire, together with all infected plant debris. *G. fujikuroi* assumes a virulent form under the very warm and humid conditions prevailing in the spring, when the budding canes should be carefully scrutinized and any fresh foci of infection exterminated as they arise.

Wiehe (P. O.). **La mortalité des boutures de Canne à la plantation.** [The mortality of Cane cuttings on planting.]—*Rev. agric. Maurice*, xxvi, 3, pp. 138–145, 1947.

Among the causes of the failure of sugar-cane cuttings in Mauritius are pineapple disease (*Ceratostomella paradoxa*) [*R.A.M.*, xxvi, p. 126], chlorotic streak [loc. cit.; see also ibid., xxvi, pp. 263, 264], and red rot (*Physalospora tucumanensis*) [ibid., xxvi, pp. 233, 564].

The effect of humidity on attack by *C. paradoxa* was demonstrated in one experiment, carried out in September and October, 1946, in which the percentage of

cuttings attacked in irrigated plots was 13 and in the non-irrigated 22·7. Other studies showed that in susceptible varieties invasion of the tissues by *C. paradoxa* kills the young suckers even before they have become established. In tolerant varieties the tissues do not resist the fungus, but as growth is rapid, mortality is low even when infection is severe. In resistant ones, invasion of the tissues is prevented. According to this classification, M112/34, M171/30, and M134/32 are susceptible, M165/38 and M76/39 are tolerant, and M63/39 is relatively resistant. If climatic conditions favour attack, tolerant varieties may show high mortality. Experiments on control showed that dipping the cut ends in a 1 per cent. solution of aretan [ibid., xxiv, p. 249] reduced the percentage of infection from 68·7 to 5·2; when conditions favour the disease, or the outbreak is severe, a 2 per cent. concentration should be used. Apart from its fungicidal value, aretan accelerated the germination of the suckers, increased rate of growth, and stimulated secondary stems. Milk of lime for 24 hours reduced percentage infection from 53·5 to 20·2 and stimulated sucker formation, while quicklime reduced it from 68·7 to 29·7.

The efficacy of the hot water treatment against chlorotic streak was demonstrated by an experiment in which treated BH10/12 and M168/32 canes (20 minutes at 52° C.) developed no disease, as against 42·8 and 35·8 per cent. infection for the untreated lots of the two varieties, respectively. The damage caused by the disease in Mauritius appears to be of some importance. The varieties M134/32, M112/34, M165/38, M63/39, and M76/39 show every evidence of susceptibility.

Locally, red rot mainly affects growing canes, no healthy cuttings having been observed to be attacked after planting. Rigorous selection of cuttings appears to be the only means of control, and any cane showing a red discoloration of the tissues when cuttings are being made should be discarded.

Graff (P. W.). **Fungi from the Mountain Lake region of Virginia.**—*Castanea*, xii, 1, pp. 9–24, 1947.

Included in this critically annotated list of fungi and Myxomycetes collected during July and August, 1945, near Mountain Lake, Giles County, Virginia, are the heteroecious rusts *Coleosporium solidaginis* [*R.A.M.*, xxiii, p. 245] on pitch pine (*Pinus rigida*) in the state formerly known as *Peridermium acicolum* [ibid., x, p. 497], and on the alternate hosts *Solidago hispida*, *S. neglecta*, *S. caesia*, and *S. odora*; and *Pucciniastrum myrtilli* [ibid., xxii, p. 489] on *Tsuga canadensis*, the alternate state being found on *Rhododendron viscosum* and *R. nudiflorum*.

Dimerosporium [*Apiosporina*] *collinsii* was responsible for the development of a large witches' broom on *Amelanchier canadensis* [ibid., viii, p. 144], accompanied by a scorched appearance of the foliage due to the superficial growth of dark hyphae giving rise to an abundance of black ascocarps.

Lindquist (J. C.). **Algunas Uredinales, nuevas o críticas para la República Argentina.** [Some Uredinales new or critical for the Argentine Republic.]—*Not. Mus. La Plata*, Bot., xi, 54, pp. 371–383, 2 figs., 1947.

Two of the rusts comprised in this critically annotated list [cf. *R.A.M.*, xxv, p. 234] are new species for Argentina. The detection in the type material of *Coleosporium calendulae* on *Calendula officinalis* of cylindrical to clavate, continuous teleutospores, 72 to 90 by 18 to 22 μ, which were evidently overlooked by Spegazzini [ibid., v, p. 128], enabled the author to complete the diagnosis of the species.

Hirschhorn (Elisa). **Critical observations on the Ustilaginaceae.**—*Farlowia*, iii, 1, pp. 73–93, 2 figs., 4 pl., 1947.

The author states that the taxonomic literature is full of species based upon slight biometric differences or on their physiological specialization to a single genus

or species of host plant. This is illustrated by the treatment of the smuts growing on *Polygonum* spp. and, to a certain extent, those on *Carex* and *Rhynchospora* spp. Since, however, it is known that the fungus species consist of physiologic forms differing only in their capacity to attack certain host plants and not others, the value of these criteria must be reconsidered. On this basis certain species of *Ustilago* and *Cintractia*, formerly considered distinct, are merged. Owing to conflicting opinions over the species *U. hypodytes* [*R.A.M.*, xxiv, p. 420] it is proposed that the specimen on the type host *Elymus arenarius* collected by P. Sydow near Berlin in October, 1884, should be chosen as the lectotype. Such a choice has the advantage that the species was widely distributed in Rabenhorst's Fungi Europea, Ser. 2, as number 3201. The only slight difference between *U. zeae* [*U. maydis*] and *U. euchlaenae* is that the latter produces paler chlamydospores, a fact which hardly justifies recognizing the two species as being even varietally distinct. Therefore the later name *U. euchlaenae* should become a synonym. *U. kellermanii* was included by Ciferri [ibid., x, p. 756] as a synonym of *U. euchlaenae*; its characters, however, are sufficiently distinct to warrant its maintenance as a distinct species; it does not form galls and the chlamydospores are darker and have more pronounced echinulations. Although the maintenance of *U. kellermanii* is tentatively suggested final dispositions should be held over until the necessary experimental studies with cross-inoculations have been made.

Moreau (C.) & Moreau (Mireille). **Sur les genres Alternaria et Stemphylium.** [On the genera *Alternaria* and *Stemphylium*.]—*Bull. Soc. mycol. Fr.*, lxiii, 1–2, pp. 58–71, 6 figs., 1947.

Comparison of the spores of *Alternaria brassicae* [*R.A.M.*, xxvi, p. 405], *A. tenuis*, *A. stemphylioides*, and *Stemphylium botryosum* var. *botrytis* [cf. *Pleospora herbarum*: ibid., ix, p. 411; xviii, p. 141] showed that they were all multicellular, fuliginous, and formed by budding, i.e., that they were dictyoblastospores. Morphological features that distinguish the two genera, on the other hand, are the presence of chains of spores and the tapering beak of *Alternaria* spores, and no such chains and a tapering base in *Stemphylium*. A distinguishing biological character is that while the *Alternaria* spores can proliferate from the apical cell, the *Stemphylium* spore can do so from the basal cell; the latter can therefore be regarded as a pseudoaleuriospore.

Piane (V.). **Les champignons vénéneux du Haut-Bugey.** [The poisonous fungi of Haut-Bugey.]—*Bull. Soc. Nat. Oyonnax*, i, 1, pp. 64–87, 1947.

In this comprehensive paper on the poisonous fungi most commonly found in the Haut-Bugey region of Ain, France, the author deals separately with the regularly and irregularly toxic species. In the first category the phalloidal, sudorial, and gastro-intestinal effects of poisoning by *Amanita*, *Inocybe*, and *Tricholoma* spp., respectively, together with the nature of the poison and the appropriate treatments, are described. The muscarine content of several *Inocybe* and *Clitocybe* spp. is given, and from this the reason for the irregularity of their toxicity can be seen. The distinguishing characteristics of a few of the above species are described to enable confusion with similar edible varieties to be avoided. The chief species of irregular toxicity, *Amanita muscaria*, *A. pantherina*, and *Agaricus xanthoderma*, besides several other less dangerous species which are common in this region, are described under the same headings as the previous group.

Skinner (C. E.) & Bouthilet (R.). **Melibiose broth for classifying yeasts.**—*J. Bact.*, liii, 1, pp. 37–43, 1947.

By fermenting away the fructose portion of raffinose in 3 per cent. raffinose broth with *Saccharomyces cerevisiae* var. *ellipsoideus*, melibiose is the only sugar

left in the medium which, when re-sterilized, may be used as a melibiose broth for differentiating yeasts [cf. next abstract]. The broth, concentrated to half-volume, gives a differentiation between melibiose- and non-melibiose-fermenting yeasts in seven or eight days in comparison with three weeks or more necessary with Wickerham's method (*J. Bact.*, xlvi, pp. 501–505, 1943) [and cf. *R.A.M.*, xxvi, p. 81] and two or three weeks with the unconcentrated melibiose broth.

Schultz (A. S.) & Atkin (L.). **The utility of bios response in yeast classification and nomenclature.**—*Arch. Biochem., N.Y.*, xiv, 3, pp. 369–380, 1947.

A simplified method for the classification of yeasts [*R.A.M.*, xxvi, p. 81] according to their bios requirements is presented [cf. preceding abstract]. The basal medium contains casein hydrolysate as a nitrogen source and six growth factors, inositol, calcium pantothenate, biotin, thiamine (B_1), pyridoxine (B_6), the two last in combination as well as singly, and nicotinic acid. A bios number assigned to each type indicates the factor or factors the individual omission of which precludes the full growth of the culture.

On this basis strains, varieties, or races of *Saccharomyces cerevisiae* and *S. carlsbergensis* were sub-classified into 13 and 6 types, and the bios requirements of 14 other *S.* spp., eight types of *Torula*, and a number of miscellaneous yeasts were also determined. Seven nicotinic acid-requiring species were found to be incapable of fermenting lactose.

Magee (C. J.). **Sclerotium stem rot caused by Sclerotium rolfsii.**—*Agric. Gaz. N.S.W.*, lviii, 5, pp. 265–267, 2 figs., 1947.

Sclerotium rolfsii is becoming increasingly widespread in New South Wales, where it has been recorded on *Antirrhinum*, bean [*?Phaseolus vulgaris*], beet [*R.A.M.*, xxiii, p. 430], carnation, carrot [ibid., xxv, p. 23], cauliflower, *Convolvulus*, cotton, cowpea, *Chrysanthemum*, *Daphne*, eggplant, fig, grasses, *Hydrangea*, rhubarb, rock melon [*Cucumis melo*], squash, sweet potato, tobacco, tomato, violet, watermelon, and apple, citrus, and peach stocks. The disease is most troublesome under hot, humid conditions in soils rich in decaying vegetable matter, while the susceptibility of different host plants also appears to be related to the extent to which they shade the soil and so increase local humidity.

The fungus is usually introduced into a farm or garden in seedlings, soil, or manure, which should be carefully examined for the presence of sclerotia. If the disease occurs in vegetable- or flower-beds, the soil at the base of the affected plants should be drenched with copper sulphate solution (1 in 10). All infected plants should be burned because the fungus develops profusely in compost heaps, with prolific production of sclerotia which may become distributed throughout a garden. Attention to surface drainage, wider spacing, and the use of supports for climbing and straggling plants are all likely to help in minimizing losses on infected land. Soil dressings of sulphate of ammonia (4 to 5 cwt. per acre) are reported to have reduced losses in some countries, and rotations with wheat and barley in autumn and winter are also reported to reduce carry-over from summer to summer.

Clayton (E. E.). **New kinds of Tobacco.**—*Yearb. Agric. U.S. Dep. Agric., 1943–1947*, pp. 363–368, 1 pl., 1947.

Reviewing the progress made in the development of disease-resistant tobacco varieties in the United States, the author states that T.I. 89 is distinctly resistant to black root rot [*Thielaviopsis basicola*: *R.A.M.*, xxv, 189; xxvi, p. 189], while the slightly resistant 400 also shows resistance to bacterial wilt [*Xanthomonas solanacearum*], southern stem rot [unspecified], and leaf spot [*? Cercospora nicotianae*]. This combination of resistance added to the natural vigour of the variety causes 400 frequently to outyield older flue-cured varieties by 300 lb. cured leaf

per acre. Oxford 1 is highly resistant to black shank [*Phytophthora parasitica* var. *nicotianae*].

Ky 16 and Ky 41 A are Burley varieties resistant to black root rot [ibid., xxvi, p. 47]. Ky 34 tolerates black root rot, *Fusarium* wilt [*F. oxysporum* var. *nicotianae*: op. cit.], and mosaic, but is not recommended for general use. Ky 52 resists black root rot and mosaic and is of excellent quality. Ky 22 is more highly resistant to black root rot than earlier introductions. R.G. is resistant to black shank. In New England, growers of shade tobacco are using Conn. 15, which is highly resistant to black root rot. Havana 142 [ibid., xxv, p. 142], 211, 307, and 322 are highly resistant to black root rot [cf. ibid., xxv, p. 584].

Blue mould [*Peronospora tabacina*: ibid., xxiv, p. 251] first became widespread in 1932. When *Nicotiana debneyi*, which is immune, was crossed with cultivated tobacco some of the few surviving hybrid seedlings produced a few seeds; resistant lines have been obtained that look like cultivated tobacco and cross readily with it.

Sukhov (K. S.) & Vovk (A. M.). Столбур пасленовых и меры борьбы с ним. [Woodiness of Solanaceae and the means of combating it.]—All-Union Scientific Research Institute of the Canning Industry, 32 pp., 10 figs., Moscow, 1946.

In 1945 the virus disease causing woodiness in tomatoes [*R.A.M.*, xiii, p. 133; xiv, p. 130] reduced greatly the yields of tomatoes, potatoes, chilli pepper, and eggplant in the U.S.S.R. The disease was reported from the Moscow area, South Ukraine, Moldavia, Caucasus, the Krasnodar district, Crimea, the Rostov area, also from Central Asia—South Kazachstan, Kirghiz, and Uzbekistan. In the Krasnodar district 30 per cent. of the chilli and eggplants withered and died as a result of infection and also 70 per cent. of the early potatoes and 52 per cent. of the summer varieties. In the Crimea eggplants and chillis suffered 50 to 70 per cent. loss, early potatoes 40 to 70 per cent., and tomatoes 40 to 60 per cent. The withering was attributed to woodiness virus [tomato big bud virus; ibid., xxvi, p. 135].

In the course of experiments in 1945 the authors found that the potato yellows disease, the symptoms of which were identical with those of the potato disease due to aster yellows virus in the United States [ibid., xxvi, p. 411] was also due to the woodiness virus. In the Moscow area, where yellows was widespread, cuttings from a diseased potato plant were grafted on to ten healthy tomato plants. After 18 to 20 days leaf chlorosis and all other symptoms of woodiness developed.

Further experiments in the summer of 1945 showed that the insect *Hyalesthes obsoletus* was the vector of woodiness. Sixty insects fed previously on diseased plots and transferred to six healthy tomato plants caused 50 per cent. woodiness, 140 on 12 plants 41·6 per cent., and 226 on 9 plants 22·2 per cent., while all of the 650 control plants remained healthy. Apparently only about 5 per cent. of the insects were carriers of the infection. In northern districts, where *H. obsoletus* does not occur, the disease is thought to be transmitted by another species. In hot summer weather the incubation period was 23 to 30 days. In cooler weather the first symptoms of disease may appear later. Many weeds are attacked by the virus. It is suggested that the virus overwinters on the perennials.

Diseased potatoes grafted to healthy tomatoes caused 16·6 to 33·3 per cent. infection; diseased tomatoes to healthy 26·7; chilli to tomato 5·5; potato to chilli 4·6; tomato to chilli 6; potato to eggplant 20; and tomato to eggplant 4·4.

Experiments in the Crimea showed the eggplant variety Bolgarski 014 to be most susceptible to woodiness (77 per cent.) and Bolgarski 7/14 the least (6·8 per cent.).

Only in the case of potatoes can effective control measures be recommended. On potatoes planted during the first ten days of July neither *H. obsoletus* nor woodiness was observed. The Wohltmann potato variety planted on 25th April showed 52·9 per cent. of infection, whereas the same variety planted on 9th July showed only 0·1 per cent. of the disease.